## G0.0+0.0 Sgr A East

**RA:** $17^h45^m44^s$ **1-GHz flux/Jy:** 100? **Size/arcmin:** 3.5×2.5
**Dec:** –29°00′ **Spectral index:** 0.8? **Type:** S

**Radio:** Non-thermal shell, in complex region, interacting with molecular material to the west.
**X-ray:** Diffuse emission, centrally peaked.
**Point sources:** Compact X-ray/radio source.

**References:**


Ekers *et al.* 1983, A&A, 122, 143. VLA at 1.4 GHz and 5 GHz (both 5″×8″), $S_{1.4\ GHz}$=77 Jy, $S_{5.0\ GHz}$=31 Jy.
Pedlar *et al.* 1989, ApJ, 342, 769. VLA at 332 MHz (12″), 1.4 GHz (1.″3×2.″5) and 5 GHz (1.″3×2.″5).
Mezger *et al.* 1989, A&A, 209, 337. Nearby molecular material.
Ho *et al.* 1991, Nature, 350, 309. VLA of $NH_3$ emission from surroundings.
Anantharamaiah *et al.* 1991, MNRAS, 249, 262. VLA at 330 MHz (17″×33″).
Serabyn *et al.* 1992, ApJ, 395, 166. Nearby molecular material.
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×88″).
Yusef-Zadeh & Mehringer 1995, ApJ, 452, L37. VLA of nearby $H_2O$ masers.
Yusef-Zadeh *et al.* 1999, ApJ, 512, 230. OH maser observations.
Coil & Ho 2000, ApJ, 533, 245. $NH_3$ observations of surroundings.
LaRosa *et al.* 2000, AJ, 119, 207. VLA at 333 MHz (24″×43″).
Fatuzzo *et al.* 2001, ApJ, 549, 293. Electron–positron lines from the vicinity.
Yusef-Zadeh *et al.* 2001, ApJ, 560, 749. Observations of nearby molecular hydrogen.
Maeda *et al.* 2002, ApJ, 570, 671. Chandra observations.
Sakano *et al.* 2003, AN, 324 (No S1), 197. XMM observations.
Roy & Rao 2004, MNRAS, 349, L25. GMRT at 620 MHz (6.′6×11.′4).
Sakano *et al.* 2004, MNRAS, 350, 129. XMM observations.
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (1″×2.″2).
Park *et al.* 2005, ApJ, 631, 964. Chandra observations.
Aharonian *et al.* 2006, ApJ, 636, 777. γ-ray detection.
Koyama *et al.* 2007, PASJ, 59, S237. Suzaku observations.
Lee *et al.* 2008, ApJ, 674, 247. Molecular $H_2$ observations of surroundings.
Sjouwerman & Pihlström 2008, ApJ, 681, 1287. VLA at 1.7 GHz of OH masers.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Tsuboi *et al.* 2012, PASJ, 64, 111. CO observations of SW.
Minh *et al.* 2013, ApJ, 773, 31. $NH_3$ observations of region.
Zhao *et al.* 2013, ApJ, 777, 146. VLA at 4.8 GHz (0.″5×0.″7), 5.5 GHz (0.″6×1.″6), and 8.3 GHz (1.″0×2.″0).
Nynka *et al.* 2013, ApJ, 778, L31. NuSTAR of compact X-ray source.


## G0.3+0.0

**RA:** $17^h46^m15^s$ **1-GHz flux/Jy:** 22 **Size/arcmin:** 15×8
**Dec:** –28°38′ **Spectral index:** 0.6 **Type:** S

Has been called G0.33+0.04 and G0.4+0.1.

**Radio:** Bilateral shell, near Galactic Centre.

**References:**


Kassim & Frail 1996, MNRAS, 283, L51. VLA at 333 MHz (23″×42″), plus review of flux densities and other observations.
LaRosa *et al.* 2000, AJ, 119, 207. VLA at 333 MHz (30″).
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (30″).


## G0.9+0.1

**RA:** $17^h47^m21^s$ **1-GHz flux/Jy:** 18? **Size/arcmin:** 8
**Dec:** –28°09′ **Spectral index:** varies **Type:** C

**Radio:** Flat spectrum core within steep spectrum shell.
**X-ray:** Central core, with non-thermal spectrum.
**Point sources:** Central pulsar.

**References:**


Helfand & Becker 1987, ApJ, 314, 203. VLA at 1.4 and 5 GHz, and Einstein observations.
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×91″).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Mereghetti *et al.* 1998, A&A, 331, L77. X-ray detection.
LaRosa *et al.* 2000, AJ, 119, 207. VLA at 333 MHz (43″×24″).
Sidoli *et al.* 2000, A&A, 361, 719. BeppoSAX observations.
Gaensler *et al.* 2001, ApJ, 556, L107. Chandra observations.
Porquet *et al.* 2003, A&A, 401, 197. XMM observations.
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (8.″6×11.″3).
Aharonian *et al.* 2005, A&A, 432, L25. γ-ray detection.
Dubner *et al.* 2008, A&A, 487, 1033. ATCA and VLA at 1.4 GHz (1.″2×2.″5 : $S = 8.3\pm0.7$ Jy), 5 GHz (1.″6×2.″5) and 8.3 GHz (0.″8×1.″5).
Camilo *et al.* 2009, ApJ, 700, L34. Pulsar detection.
Holler *et al.* 2012, A&A, 539, A24. Chandra and XMM observations.

## G1.0–0.1

**RA:** $17^h48^m30^s$ **1-GHz flux/Jy:** 15 **Size/arcmin:** 8
**Dec:** –28°09′ **Spectral index:** 0.6? **Type:** S

Has been called G1.05–0.1 and G1.05–0.15.

**Radio:** Incomplete shell, to the S of Sgr D.

**X-ray:** Possibly detected.

**References:**


Downes *et al.* 1979, A&AS, 35, 1. Review of flux densities.
Anantharamaiah *et al.* 1991, MNRAS, 249, 262. VLA at 330 MHz (64″×100″ : $S$ = 12.3 Jy).
Liszt 1992, ApJS, 82, 495. VLA at 1.6 GHz (13″×23″).
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×91″).
Mehringer *et al.* 1998, ApJ, 493, 274. VLA at 1.6 GHz (15″×28″) and 5 GHz, including masers observations.
Yusef-Zadeh *et al.* 1999, ApJ, 527, 172. VLA of nearby OH masers.
LaRosa *et al.* 2000, AJ, 119, 207. VLA at 333 MHz (43″×24″).
Sidoli *et al.* 2001, A&A, 372, 651. BeppoSAX possible detection.
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (30″).
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Nobukawa *et al.* 2009, AdSpR, 43, 1045. Suzaku observations.
Marquez-Lopez & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.


## G1.4–0.1

**RA:** $17^h49^m39^s$ **1-GHz flux/Jy:** 2? **Size/arcmin:** 10
**Dec:** –27°46′ **Spectral index:** ? **Type:** S

**Radio:** Shell, brightest in E.

**References:**


Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×92″ : $S$ = 2 Jy).
Yusef-Zadeh *et al.* 1999, ApJ, 527, 172. VLA of nearby OH masers.
Bhatnagar 2002, MNRAS, 332, 1. GMRT at 327 MHz (2.′7×2.′4 : $S$ = 4.2±0.5).
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (8.″2×12.″2).
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.


## G1.9+0.3

**RA:** $17^h48^m45^s$ **1-GHz flux/Jy:** 0.6 **Size/arcmin:** 1.5
**Dec:** –27°10′ **Spectral index:** 0.6 **Type:** S

**Radio:** Shell, brighter to the N, brightening.

**X-ray:** Shell, with bright limbs to E and W.

**References:**


Green & Gull 1984, Nature, 312, 527. VLA at 5 GHz (4.″4×2″).
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×94″).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (8.″3×12″).
Nord *et al.* 2004, AJ, 128, 1646. VLA at 330 MHz (7″×12″).
Green 2004, BASI, 32, 335. VLA at 1.5 GHz (7.″2×9.″4).
Reynolds *et al.* 2008, ApJ, 680, L41. Chandra observations.
Green *et al.* 2008, MNRAS, 387, L54. VLA at 4.86 GHz (4″×10″), for expansion studies.
Murphy *et al.* 2008, MNRAS, 389, L23. MOST at 843 MHz for flux increase.
Gómez & Rodríguez 2009, RMxAA, 45, 91. VLA at 1.5 GHz (5.″1×10.″6).
Reynolds *et al.* 2009, ApJ, 695, L149. Chandra spectroscopy.
Borkowski *et al.* 2010, ApJ, 724, L161. Chandra observations.
Carlton *et al.* 2011, ApJ, 737, L22. Chandra expansion studies.
Borkowski *et al.* 2013, ApJ, 771, L9. Chandra observations.


## G3.7–0.2

**RA:** $17^h55^m26^s$ **1-GHz flux/Jy:** 2.3 **Size/arcmin:** 14×11
**Dec:** –25°50′ **Spectral index:** 0.65 **Type:** S

Has been called G003.8–00.3.

**Radio:** Double arc.

**References:**


Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×99″ : $S$ = 2.4 Jy).
Gaensler 1998, ApJ, 493, 781. VLA at 1.4 GHz (9″×15″ : $S$ = 1.7±0.1 Jy).
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (8.″4×11.″4).

## G3.8+0.3

**RA:** $17^h52^m55^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 18
**Dec:** –25°28′ **Spectral index:** 0.6 **Type:** S?

**Radio:** Incomplete shell.

**References:**

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×100″: $S$=3.5 Jy).
Bhatnagar 2002, MNRAS, 332, 1. GMRT at 327 MHz (27″×17″: $S$=6.0±0.4).

## G4.2–3.5

**RA:** $18^h08^m55^s$ **1-GHz flux/Jy:** 3.2? **Size/arcmin:** 28
**Dec:** –27°03′ **Spectral index:** 0.6? **Type:** S

**Radio:** Elongated shell.

**Optical:** Detected.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G4.5+6.8 Kepler, SN1604, 3C358

**RA:** $17^h30^m42^s$ **1-GHz flux/Jy:** 19 **Size/arcmin:** 3
**Dec:** –21°29′ **Spectral index:** 0.64 **Type:** S

This is the remnant of Kepler's SN of AD1604.

**Radio:** Incomplete shell, brighter to the N.

**Optical:** Faint filaments.

**X-ray:** Shell, brighter to the N.

**Distance:** Optical expansion and proper motion indicates about 2.9 kpc, HI observations suggest 3.4 to 6.4 kpc.

**References:**

van den Bergh & Kamper 1977, ApJ, 218, 617. Optical proper motions.
Leibowitz & Danziger 1983, MNRAS, 204, 273. Optical spectra.
White & Long 1983, ApJ, 264, 196. Einstein observations.
Matsui *et al.* 1984, ApJ, 287, 295. VLA at 1.4 (2″.5×3″.2) and 5 GHz (3″.2×4″.8) and Einstein image (5″).
Dickel *et al.* 1988, ApJ, 330, 254. VLA at 1.4 (1″.2×2″.3) and 5 GHz (0″.6×1″.0) at two epochs.
Smith *et al.* 1989, ApJ, 347, 925. EXOSAT observations.
Hatsukade *et al.* 1990, PASJ, 42, 279. X-ray spectrum.
Blair *et al.* 1991, ApJ, 366, 484. Optical imaging and spectroscopy.
Bandiera & van den Bergh 1991, ApJ, 374, 186. Optical changes.
van den Bergh 1991, PASP, 103, 194. Optical imaging.
Predehl & Schmitt 1995, A&A, 293, 889. ROSAT of dust scattered halo.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Hughes 1999, ApJ, 527, 298. ROSAT and Einstein image comparison for expansion studies.
Reynoso & Goss 1999, AJ, 118, 926. VLA at 1.4 GHz (23″×13″) for HI studies.
Kinugasa & Tsunemi 1999, PASJ, 51, 239. ASCA observations.
Gerardy & Fesen 2001, AJ, 121, 2781. IR spectroscopy and imaging.
DeLaney *et al.* 2002, ApJ, 580, 914. VLA at 1.3 to 1.5 GHz and 5 GHz (7″.2) for spectral index studies.
Morgan *et al.* 2003, ApJ, 597, L33. Sub-mm dust observations.
Sollerman *et al.* 2003, A&A, 407, 249. Optical spectroscopy.
Cassam-Chenaï *et al.* 2004, A&A, 414, 545. XMM observations.
Bamba *et al.* 2005, ApJ, 621, 793. Chandra observations of rim.
Riesgo & López 2005, RMxAA, 41, 57. Optical observations of filament (previously classified as PN, H 2-12).
Blair *et al.* 2007, ApJ, 662, 998. Spitzer observations.
Reynolds *et al.* 2007, ApJ, 668, L135. Chandra observations.
Sankrit *et al.* 2008, AJ, 135, 538. HST observations.
Aharonian *et al.* 2008, A&A, 488, 219. γ-ray upper limit.
Enomoto *et al.* 2008, ApJ, 683, 383. γ-ray upper limit.
Katsuda *et al.* 2008, ApJ, 689, 225. Chandra proper motion studies.
Vink *et al.* 2008, ApJ, 689, 231. Chandra proper motion studies.
Gomez *et al.* 2012, MNRAS, 420, 3557. Herschel IR dust observations.
Williams *et al.* 2012, ApJ, 755, 3. Spitzer spectroscopy.
Burkey *et al.* 2013, ApJ, 764, 63. Chandra observations.
Yang *et al.* 2013, ApJ, 766, 44. Suzaku spectroscopy.
Park *et al.* 2013, ApJ, 767, L10. Suzaku observations.

## G4.8+6.2

**RA:** $17^h33^m25^s$ **1-GHz flux/Jy:** 3 **Size/arcmin:** 18
**Dec:** –21°34′ **Spectral index:** 0.6 **Type:** S

Has been called G4.5+6.2.

**Radio:** Faint shell.

**References:**

Duncan *et al.* 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz (10′.4).
Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz (2′.2×1′.3 : $S$ = 5.5±1.2 Jy), and NVSS at 1.4 GHz.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G5.2–2.6

**RA:** $18^h07^m30^s$ **1-GHz flux/Jy:** 2.6? **Size/arcmin:** 18
**Dec:** –25°45′ **Spectral index:** 0.6? **Type:** S

**Radio:** Poorly resolved shell.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G5.4–1.2 Milne 56

**RA:** $18^h02^m10^s$ **1-GHz flux/Jy:** 35? **Size/arcmin:** 35
**Dec:** –24°54′ **Spectral index:** 0.2? **Type:** C?

Part been called G5.3–1.0. Has been suggested that this is not a SNR.

**Radio:** Incomplete shell, including wide 'v' of emission to east with small flat-spectrum source at apex.

**Optical:** Detected.

**X-ray:** Pulsar detected, with faint extension.

**Point sources:** Pulsar nearby, in flat spectrum source.

**Distance:** HI absorption suggests > 4.3 kpc.

**References:**

Clark *et al.* 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : $S$ = 38 Jy).
Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′.8 : $S$ = 21.9±2.4 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Zealey *et al.* 1979, A&AS, 38, 39. Optical detection.
Becker & Helfand 1985, Nature, 313, 115. VLA at 1.4 and 5 GHz.
Helfand & Becker 1985, Nature, 313, 118. Suggesting it is not a SNR.
Manchester *et al.* 1985, MNRAS, 212, 975. Pulsar detection.
Caswell *et al.* 1987, MNRAS, 225, 329. MOST at 843 MHz (42″×110″).
Frail & Kulkarni 1991, Nature, 352, 785. Pulsar and remnant association.
Manchester *et al.* 1991, MNRAS, 253, 7P. Pulsar and remnant association.
Milne *et al.* 1992, MNRAS, 255, 707. Parkes 64-m at 4.75 (4′.5 : $S$ = 30.8±2.1 Jy) and 8.4 GHz (3′ : $S$ = 24±3 Jy), including polarisation.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.0×4′.9 : $S$ = 38 Jy).
Frail *et al.* 1994, AJ, 107, 1120. VLA at 327 MHz (68″×73″), plus HI absorption.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Gaensler & Frail 2000, Nature, 406, 158. Pulsar observations, including proper motion.
Kaspi *et al.* 2001, ApJ, 562, L163. X-ray detection of pulsar, and upper limit for remnant.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 10.6 GHz, including polarisation.
Blazek *et al.* 2006, ApJ, 652, 1523. Proper motion study of pulsar.
Zeiger *et al.* 2008, ApJ, 674, 271. Proper motion study of pulsar.
Liszt *et al.* 2009, A&A, 508, 1331. CO and IR observations of region.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser detection.

## G5.5+0.3

**RA:** $17^h57^m04^s$ **1-GHz flux/Jy:** 5.5 **Size/arcmin:** 15×12
**Dec:** –24°00′ **Spectral index:** 0.7 **Type:** S

Has been called G5.55+0.32.

**Radio:** Shell.

**Optical:** Detected.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 14.3±0.3 Jy), plus other observations.
Liszt *et al.* 2009, A&A, 508, 1331. CO and IR observations of region.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G5.9+3.1

**RA:** $17^h47^m20^s$ **1-GHz flux/Jy:** 3.3? **Size/arcmin:** 20
**Dec:** –22°16′ **Spectral index:** 0.4? **Type:** S

**Radio:** Asymmetric shell.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Effelsberg 100-m at 2.7 GHz (4′.3).
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G6.1+0.5

**RA:** $17^h57^m29^s$ **1-GHz flux/Jy:** 4.5 **Size/arcmin:** 18×12
**Dec:** –23°25′ **Spectral index:** 0.9 **Type:** S

Has been called G6.10+0.53.

**Radio:** Partial shell.

**Optical:** Detected.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 13.4±0.2 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G6.1+1.2

**RA:** $17^h54^m55^s$ **1-GHz flux/Jy:** 4.0? **Size/arcmin:** 30×26
**Dec:** –23°05′ **Spectral index:** 0.3? **Type:** F

Has been called G6.1+1.15.

**Radio:** Faint, diffuse emission.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Junkes *et al.* 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz (4′.3), including polarisation.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G6.4–0.1 W28

**RA:** $18^h00^m30^s$ **1-GHz flux/Jy:** 310 **Size/arcmin:** 48
**Dec:** –23°26′ **Spectral index:** varies **Type:** C

Has been called G6.6–0.2.

**Radio:** Several non-thermal sources in a ring, with flat spectrum core.
**Optical:** Diffuse emission.
**X-ray:** Diffuse emission from most of the remnant.
**Point sources:** Young pulsar near edge of remnant, but not thought to be related.
**Distance:** HI observations suggest 1.9 kpc.

**References:**


Kundu & Velusamy 1972, A&A, 20, 237. NRAO 140-ft at 10 GHz (3′).
van den Bergh *et al.* 1973, ApJS, 26, 19. Optical observations.
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8.′4) and 5 GHz (4.′4).
Dopita *et al.* 1977, ApJ, 214, 179. Some optical line ratios.
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
Andrews *et al.* 1983, ApJ, 266, 684. VLA at 1.4 GHz (8″) 4.9 GHz (3″) and 15 GHz (1″) of central region only, plus Einstein image of central region.
Bohigas *et al.* 1983, RMxAA, 8, 155. Optical spectra.
Odenwald *et al.* 1984, ApJ, 279, 162. Nearby IR source.
Andrews *et al.* 1985, AJ, 90, 310. VLA of central component.
Long *et al.* 1991, ApJ, 373, 567. Einstein and optical observations.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′1×4.′4 : $S$ = 660 Jy).
Kaspi *et al.* 1993, ApJ, 409, L57. Pulsar association.
Frail *et al.* 1993, Nature, 365, 136. VLA at 327 MHz (smoothed to 65″), plus pulsar association.
Frail *et al.* 1994, ApJ, 424, L111. VLA of associated OH masers.
Esposito *et al.* 1996, ApJ, 461, 820. Possible associated γ-ray emission.
Frail *et al.* 1996, AJ, 111, 1651. OH maser emission.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Claussen *et al.* 1997, ApJ, 489, 143. VLA of OH masers.
Claussen *et al.* 1999, ApJ, 522, 349. High resolution observations of OH masers.
Arikawa *et al.* 1999, PASJ, 51, L7. Observations of shocked CO.
Yusef-Zadeh *et al.* 2000, ApJ, 540, 842. VLA at 327 MHz (2.′6×5.′5) and 1.48 GHz (40″×65″).
Dubner *et al.* 2000, AJ, 120, 1933. VLA at 328 MHz (97″×52″ : $S$ = 425±40 Jy) and 1415 MHz (88″×48″ : $S$ = 246±20 Jy), and comparison with other observations.
Reach & Rho 2000, ApJ, 544, 843. ISO observations of interactions with surroundings.
*see also:* Reach & Rho 2001, ApJ, 558, 943. Erratum.
Rowell *et al.* 2000, A&A, 359, 337. Upper limit on high energy γ-rays.
Douvion *et al.* 2001, A&A, 373, 281. ISO observations.
Roberts *et al.* 2001, ApJS, 133, 451. ASCA observations.
Velázquez *et al.* 2002, AJ, 124, 2145. Parkes 64-m at 1.4 GHz (15′) for HI.
Rho & Borkowski 2002, ApJ, 575, 201. ROSAT and ASCA observations.
Claussen *et al.* 2002, ApJ, 580, 909. Observations of nearby source.
Yusef-Zadeh *et al.* 2003, ApJ, 583, 267. OH observations.
Caswell 2004, MNRAS, 349, 99. ATCA at 1.7 GHz of associated OH masers.
Mavromatakis *et al.* 2004, A&A, 426, 567. Optical observations.
Reach *et al.* 2005, ApJ, 618, 297. Molecular lines and near IR observations.
Hoffman *et al.* 2005, ApJ, 620, 257. OH maser observations.
Kawasaki *et al.* 2005, ApJ, 631, 935. ASCA observations.
Neufeld *et al.* 2007, ApJ, 664, 890. Spitzer observations.
Aharonian *et al.* 2008, A&A, 481, 401. γ-ray observations.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Guilani *et al.* 2010, A&A, 516, L11. γ-ray observations.
Marquez-Lopez & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.
Abdo *et al.* 2010, ApJ, 718, 348. Fermi observations.
Yuan & Neufeld 2011, ApJ, 726, 76. Spitzer observations.
Sawada *et al.* 2012, PASJ, 64, 81. Suzaku observations.
Nichols *et al.* 2012, MNRAS, 419, 251. CO observations of selected regions.
Gusdorf *et al.* 2012, A&A, 542, L19. CO observations of regions in NE.


## G6.4+4.0

**RA:** $17^h45^m10^s$ **1-GHz flux/Jy:** 1.3? **Size/arcmin:** 31
**Dec:** –21°22′ **Spectral index:** 0.4? **Type:** S

**Radio:** Faint asymmetric shell.

**References:**


Reich *et al.* 1988, IAUCo, 101, 293. Effelsberg 100-m at 2.7 GHz (4.′3).
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G6.5–0.4

**RA:** $18^h02^m11^s$ **1-GHz flux/Jy:** 27 **Size/arcmin:** 18
**Dec:** –23°34′ **Spectral index:** 0.6 **Type:** S

Has been called G6.51–0.48, and part has been called G6.67–0.42.

**Radio:** Shell, overlapping G6.4–0.1.
**Optical:** Detected.

**References:**
Yusef-Zadeh *et al.* 2000, ApJ, 540, 842. VLA at 330 MHz (2′.6×5′.5) and 1.4 GHz (0′.7×1′.1).
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 60.8±0.4 Jy), plus other observations.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G7.0–0.1

**RA:** $18^h01^m50^s$ **1-GHz flux/Jy:** 2.5? **Size/arcmin:** 15
**Dec:** –22°54′ **Spectral index:** 0.5? **Type:** S

Has been called G7.06–0.12.

**Radio:** Double rim, brightest in W, confused by bright HII region M20 in SE.

**References:**
Yusef-Zadeh *et al.* 2000, ApJ, 540, 842. VLA at 327 MHz (2′.6×5′.5) and 1.48 GHz (40″×65″).
Dubner *et al.* 2000, AJ, 120, 1933. VLA at 328 MHz (97″×52″) and 1415 MHz (88″×48″).

## G7.2+0.2

**RA:** $18^h01^m07^s$ **1-GHz flux/Jy:** 2.8 **Size/arcmin:** 12
**Dec:** –22°38′ **Spectral index:** 0.6 **Type:** S

Has been called G7.20+0.20.

**Radio:** Partial shell.

**References:**
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 5.2±0.2 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G7.7–3.7 1814–24

**RA:** $18^h17^m25^s$ **1-GHz flux/Jy:** 11 **Size/arcmin:** 22
**Dec:** –24°04′ **Spectral index:** 0.32 **Type:** S

**Radio:** Shell, with high polarisation.

**References:**
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
Milne *et al.* 1986, MNRAS, 223, 487. MOST at 843 MHz (44″×108″) and Parkes 64-m at 8.4 GHz (3′ : $S$ = 4.6±0.5 Jy), with polarisation, plus review of flux densities.
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 1.4 GHz (70″×35″ : $S$ = 9.9±0.1 Jy), including polarisation.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G8.3–0.0

**RA:** $18^h04^m34^s$ **1-GHz flux/Jy:** 1.2 **Size/arcmin:** 5×4
**Dec:** –21°49′ **Spectral index:** 0.6 **Type:** S

Has been called G8.31–0.09.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 2.3±0.1 Jy), plus other observations.
Higashi *et al.* 2008, ApJ, 683, 957. γ-ray detection.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G8.7–5.0

**RA:** $18^h24^m10^s$ **1-GHz flux/Jy:** 4.4 **Size/arcmin:** 26
**Dec:** –23°48′ **Spectral index:** 0.3 **Type:** S

**Radio:** Asymmetric shell.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G8.7–0.1 (W30)

**RA:** $18^h05^m30^s$ **1-GHz flux/Jy:** 80 **Size/arcmin:** 45
**Dec:** –21°26′ **Spectral index:** 0.5 **Type:** S?

Has been called G8.6–0.1.

**Radio:** Clumpy non-thermal shell, with low-frequency turnover.

**X-ray:** Northern edge detected.

**Point sources:** Pulsar inside western edge.

**References:**

Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz (7′.2×9′.7 : $S$ = 190±50 Jy).
Kassim & Weiler 1990, Nature, 343, 146. VLA at 327 MHz (3′.0×3′.7).
Kassim & Weiler 1990, ApJ, 360, 184. VLA at 327 MHz (2′.8×4′.1 : $S$ = 129±11 Jy), and part at 1.4 GHz (0′.9×1′.8), plus review of flux densities.
Frail *et al.* 1994, AJ, 107, 1120. VLA at 327 MHz (37″×55″).
Finley & Ögelman 1994, ApJ, 434, L25. ROSAT observations, including pulsar.
Aharonian *et al.* 2005, Science, 307, 1938. γ-ray detection.
Aharonian *et al.* 2006, ApJ, 636, 777. γ-ray observations.
Landi *et al.* 2006, ApJ, 651, 190. X-ray observations.
Briskin *et al.* 2006, ApJ, 652, 554. Pulsar proper motion.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser detection.
Castro & Slane 2010, ApJ, 717, 372. Fermi observations.
Ajello *et al.* 2012, ApJ, 744, 80. Fermi observations.

## G8.9+0.4

**RA:** $18^h03^m58^s$ **1-GHz flux/Jy:** 9 **Size/arcmin:** 24
**Dec:** –21°03′ **Spectral index:** 0.6 **Type:** S

Has been called G8.90+0.40.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 18.2±0.5 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G9.7−0.0

**RA:** $18^h07^m22^s$ **1-GHz flux/Jy:** 3.7 **Size/arcmin:** 15×11
**Dec:** –20°35′ **Spectral index:** 0.6 **Type:** S

Has been called G9.7–0.1 and G9.70–0.06.

**Radio:** Shell.

**References:**

Frail *et al.* 1994, AJ, 107, 1120. VLA at 327 MHz.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 6.5±0.2 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser detection.

## G9.8+0.6

**RA:** $18^h05^m08^s$ **1-GHz flux/Jy:** 3.9 **Size/arcmin:** 12
**Dec:** –20°14′ **Spectral index:** 0.5 **Type:** S

**Radio:** Asymmetric shell.

**References:**

Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Caswell 1983, MNRAS, 204, 833. Molonglo at 408 MHz (3′ : $S$ = 5.8±0.6 Jy).
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz (41″×63″ : $S$ = 3.5±0.4 Jy).
Frail *et al.* 1994, AJ, 107, 1120. VLA at 327 MHz.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G9.9−0.8

**RA:** $18^h10^m41^s$ **1-GHz flux/Jy:** 6.7 **Size/arcmin:** 12
**Dec:** –20°43′ **Spectral index:** 0.4 **Type:** S

Has been called G9.95–0.81.

**Radio:** Shell.
**Optical:** Detected.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 11.0±0.3 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G10.5−0.0

**RA:** $18^h09^m08^s$ **1-GHz flux/Jy:** 0.9 **Size/arcmin:** 6
**Dec:** –19°47′ **Spectral index:** 0.6 **Type:** S

Has been called G10.59–0.04.

**Radio:** Partial shell.
**X-ray:** Detected.

**References:**

Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA observations.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 1.4±0.1 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G11.0−0.0

**RA:** $18^h10^m04^s$ **1-GHz flux/Jy:** 1.3 **Size/arcmin:** 11×9
**Dec:** −19°25′ **Spectral index:** 0.6 **Type:** S

Has been called G11.0+0.0 and G11.03–0.05.

**Radio:** Partial shell.

**X-ray:** Diffuse emission.

**References:**

Bamba *et al.* 2003, ApJ, 589, 253. ASCA observations.
Brogan *et al.* 2004, AJ, 127, 355. VLA at 330 MHz (25″), 1.5 GHz (25″), and 74 MHz.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 3.1±0.2 Jy), plus other observations.

## G11.1−1.0

**RA:** $18^h14^m03^s$ **1-GHz flux/Jy:** 5.8 **Size/arcmin:** 18×12
**Dec:** −19°46′ **Spectral index:** 0.5 **Type:** S

Has been called G11.2–1.1 and G11.17–1.04.

**Radio:** Shell.

**Optical:** Detected.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 11.0±0.3 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 3.40±0.25 Jy) including polarisation and review of flux densities.

## G11.1−0.7

**RA:** $18^h12^m46^s$ **1-GHz flux/Jy:** 1.0 **Size/arcmin:** 11×7
**Dec:** −19°38′ **Spectral index:** 0.7 **Type:** S

Has been called G11.15–0.71.

**Radio:** Partial shell.

**References:**

Brogan *et al.* 2004, AJ, 127, 355. VLA at 330 MHz (25″), 1.5 GHz (25″), and 74 MHz.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 2.3±0.1 Jy), plus other observations.

## G11.1+0.1

**RA:** $18^h09^m47^s$ **1-GHz flux/Jy:** 2.3 **Size/arcmin:** 12×10
**Dec:** −19°12′ **Spectral index:** 0.4 **Type:** S

Has been called G11.18+0.11.

**Radio:** Shell.

**References:**

Brogan *et al.* 2004, AJ, 127, 355. VLA at 330 MHz (25″), 1.5 GHz (25″), and 74 MHz.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 3.5±0.2 Jy), plus other observations.

## G11.2−0.3

**RA:** $18^h11^m27^s$ **1-GHz flux/Jy:** 22 **Size/arcmin:** 4
**Dec:** −19°25′ **Spectral index:** 0.5 **Type:** C

Probably associated with the SN of AD386.

**Radio:** Symmetrical clumpy shell, with flatter spectrum core.
**X-ray:** Shell, with hard spectrum centrally brightened region around pulsar.
**Point sources:** Central pulsar.
**Distance:** HI absorption indicates 4.4 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Radhakrishnan *et al.* 1972, ApJS, 24, 49. HI absorption.
Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Downes 1984, MNRAS, 210, 845. VLA at 1465 MHz (20″×25″) and Einstein observations, with review of flux densities.
Becker *et al.* 1985, ApJ, 296, 461. VLA at 1.4 and 5 GHz, plus HI absorption, Einstein observations.
Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (26.″5 : $S$ = 4.04±0.24 Jy).
Green *et al.* 1988, MNRAS, 231, 735. VLA at 1.4 and 5 GHz.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′2×4.′1 : $S$ = 39 Jy).
Reynolds *et al.* 1994, MNRAS, 271, L1. ROSAT image and spectra.
Vasisht *et al.* 1996, ApJ, 456, L59. ASCA observations.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Torii *et al.* 1997, ApJ, 489, L145. ASCA detection of pulsar.
Torii *et al.* 1999, ApJ, 523, L69. X-ray timing observations of pulsar.
Kothes & Reich 2001, A&A, 372, 627. Effelsberg 100-m at 4.25, 10.45, 14.9 and 32 GHz (2.′5, 1.′1, 0.′86 and 0.′45 : $S$ = 9.6±0.5, 6.3±0.4, 5.7±0.4 and 3.8±0.4).
Kaspi *et al.* 2001, ApJ, 560, 371. Chandra observations.
Tam *et al.* 2002, ApJ, 572, 202. VLA at 1.4/1.5 GHz (2.″6×1.″8 : $S$ = 16.6±0.9 Jy) and 5 GHz (2.″1×1.″5 : $S$ = 8.4±0.9 Jy) for spectral studies.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 14.7 GHz.
Tam & Roberts 2003, ApJ, 598, L27. Multi-epoch VLA observations at 1.4/1.5 GHz and 5 GHz, for expansion studies.
Roberts *et al.* 2003, ApJ, 588, 992. Chandra observations.
Brogan *et al.* 2004, AJ, 127, 355. VLA at 330 MHz (25″), 1.5 GHz (25″), and 74 MHz.
Bock & Gaensler 2005, ApJ, 626, 343. BIMA at 88.6 GHz (18″).
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Kaplan & Moon 2006, ApJ, 644, 1056. IR upper limit for pulsar.
Koo *et al.* 2007, ApJ, 657, 308. IR observations.
Dean *et al.* 2008, MNRAS, 384, L29. Integral observations of pulsar and nebula.
Moon *et al.* 2009, ApJ, 703, L81. IR spectroscopy.
Mizuno *et al.* 2010, AJ, 139, 1542. Spitzer observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 9.0±0.5 Jy) including polarisation and review of flux densities.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.
Lee *et al.* 2013, ApJ, 770, 143. IR observations.


## G11.4−0.1

**RA:** $18^h10^m47^s$ **1-GHz flux/Jy:** 6 **Size/arcmin:** 8
**Dec:** −19°05′ **Spectral index:** 0.5 **Type:** S?

**Radio:** Incomplete shell, possibly with central core.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 9.4 Jy) contaminated by sidelobes of a nearby source, and Parkes 64-m at 5 GHz (4′ : $S$ = 2.8 Jy).
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6.′8 : $S$ = 2.0±0.4 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′2×4.′1 : $S$ = 18 Jy).
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz (44″×63″ : $S$ = 5.1±0.6 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Brogan *et al.* 2004, AJ, 127, 355. VLA at 330 MHz (25″), 1.5 GHz (25″), and 74 MHz.

## G11.8−0.2

**RA:** $18^h12^m25^s$ **1-GHz flux/Jy:** 0.7 **Size/arcmin:** 4
**Dec:** −18°44′ **Spectral index:** 0.3 **Type:** S

Has been called G11.89–0.21.

**Radio:** Shell.

**X-ray:** Detected.

**References:**

Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA observations.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 0.9±0.1 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G12.0−0.1

**RA:** $18^h12^m11^s$ **1-GHz flux/Jy:** 3.5 **Size/arcmin:** 7?
**Dec:** −18°37′ **Spectral index:** 0.7 **Type:** ?

**Radio:** Incomplete shell, defined in E only.

**X-ray:** Detected.

**References:**

Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 6.6 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 1.1 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′2×4.′1).
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz (41″×61″ : $S$ = 0.7 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.

## G12.2+0.3

**RA:** $18^h11^m17^s$ **1-GHz flux/Jy:** 0.8 **Size/arcmin:** 6×5
**Dec:** −18°10′ **Spectral index:** 0.7 **Type:** S

Has been called G12.26+0.30.

**Radio:** Partial shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 1.5±0.1 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G12.5+0.2

**RA:** $18^h12^m14^s$ **1-GHz flux/Jy:** 0.6 **Size/arcmin:** 6×5
**Dec:** −17°55′ **Spectral index:** 0.4 **Type:** C?

Has been called G12.58+0.22.

**Radio:** Diffuse, central brightened.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 0.8±0.1 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G12.7−0.0

**RA:** $18^h13^m19^s$ **1-GHz flux/Jy:** 0.8 **Size/arcmin:** 6
**Dec:** −17°54′ **Spectral index:** 0.8 **Type:** S

Has been called G12.72–0.00.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 2.0±0.1 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G12.8−0.0

**RA:** $18^h13^m37^s$ **1-GHz flux/Jy:** 0.8 **Size/arcmin:** 3
**Dec:** −17°49′ **Spectral index:** 0.5 **Type:** C?

Has been called G12.82–0.02 and G12.83–0.02.

**Radio:** Shell.

**X-ray:** Diffuse.

**Point sources:** Central X-ray pulsar.

**References:**

Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA observations.
Brogan *et al.* 2005, ApJ, 629, L105. VLA at 330 MHz (19″×32″), plus other observations.
Ubertini *et al.* 2005, ApJ, 629, L109. X-ray, γ-ray and other observations.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 1.2±0.1 Jy), plus other observations.
Aharonian *et al.* 2006, ApJ, 636, 777. γ-ray detection.
Albert *et al.* 2006, ApJ, 637, L41. γ-ray observations.
Landi *et al.* 2006, ApJ, 651, 190. X-ray observations.
Funk *et al.* 2007, A&A, 470, 249. XMM observations, CO observations of surroundings.
Helfand *et al.* 2007, ApJ, 665, 1297. Chandra observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Gotthelf & Halpern 2009, ApJ, 700, L158. Pulsar detection.
Halpern *et al.* 2012, ApJ, 753, L14. Pulsar observations.

## G13.3−1.3

**RA:** $18^h19^m20^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 70×40
**Dec:** −18°00′ **Spectral index:** ? **Type:** S?

**Radio:** Amorphous emission.

**Optical:** Filaments in S.

**X-ray:** Elongated emission.

**Distance:** Absorption indicates 2–4 kpc.

**References:**

Seward *et al.* 1995, ApJ, 449, 681. ROSAT detection, optical studies and observations of CO.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.

## G13.5+0.2

**RA:** $18^h14^m14^s$ **1-GHz flux/Jy:** 3.5? **Size/arcmin:** 5×4
**Dec:** −17°12′ **Spectral index:** 1.0? **Type:** S

Has been called G13.46+0.16.

**Radio:** Elongated, incomplete shell.

**References:**

Helfand *et al.* 1989, ApJ, 341, 151. VLA at 5 GHz ($S$ = 0.65±0.05 Jy) and 1.4 GHz (15″ : $S$ = 2.67±0.5 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G14.1−0.1

**RA:** $18^h16^m40^s$ **1-GHz flux/Jy:** 0.5 **Size/arcmin:** 6×5
**Dec:** −16°41′ **Spectral index:** 0.6 **Type:** S

Has been called G14.18–0.12.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 0.9±0.1 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G14.3+0.1

**RA:** $18^h15^m58^s$ **1-GHz flux/Jy:** 0.6 **Size/arcmin:** 5×4
**Dec:** −16°27′ **Spectral index:** 0.4 **Type:** S

Has been called G14.30+0.14. Has been suggested this is not an SNR.

**Radio:** Partial shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 1.2±0.1 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Pinheiro Gonçalves *et al.* 2011, AJ, 142, 47. IR observations.

## G15.1−1.6

**RA:** $18^h24^m00^s$ **1-GHz flux/Jy:** 5.5? **Size/arcmin:** 30×24
**Dec:** −16°34′ **Spectral index:** 0.0? **Type:** S?

**Radio:** Elongated, incomplete shell.
**Optical:** Diffuse shell.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Boumis *et al.* 2008, A&A, 481, 705. Optical detection.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 4.8±0.3 Jy) including polarisation and review of flux densities.

## G15.4+0.1

**RA:** $18^h18^m02^s$ **1-GHz flux/Jy:** 5.6 **Size/arcmin:** 15×14
**Dec:** −15°27′ **Spectral index:** 0.62 **Type:** S

Has been called G15.42+0.18.

**Radio:** Shell.
**Distance:** HI observations suggest 4.8 kpc.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 10.9±0.3 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 2.1±0.2 Jy) including polarisation and review of flux densities.
Castelletti *et al.* 2013, A&A, 557, L15. GMRT at 1.4 GHz (15″) plus SGPS HI and CO observations of region.

## G15.9+0.2

**RA:** $18^h18^m52^s$ **1-GHz flux/Jy:** 5.0 **Size/arcmin:** 7×5
**Dec:** –15°02′ **Spectral index:** 0.63 **Type:** S?

**Radio:** Incomplete shell, with bright concentration to the E.
**X-ray:** Shell, brighter to S and E.

**References:**

Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 7.7 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 1.9 Jy).
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6.′8 : $S$ = 1.1±0.2 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Caswell *et al.* 1982, MNRAS, 200, 1143. FIRST at 1415 MHz (58″×44″).
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 330 MHz (77″×61″ : $S$ = 11.2±1.0 Jy), 1.4 GHz (23″×14″ : $S$ = 3.9±0.1 Jy) and 4.9 GHz (13″×16″).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Reynolds *et al.* 2006, ApJ, 652, L45. Chandra observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 2.0±0.3 Jy) including polarisation and review of flux densities.

## G16.0–0.5

**RA:** $18^h21^m56^s$ **1-GHz flux/Jy:** 2.7 **Size/arcmin:** 15×10
**Dec:** –15°14′ **Spectral index:** 0.6 **Type:** S

Has been called G16.05–0.57.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 4.9±0.2 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Beaumont *et al.* 2011, ApJ, 741, 14. CO of region.

## G16.2–2.7

**RA:** $18^h29^m40^s$ **1-GHz flux/Jy:** 2.5 **Size/arcmin:** 17
**Dec:** –16°08′ **Spectral index:** 0.4 **Type:** S

**Radio:** Double rim.

**References:**

Trushkin 1999, A&A, 352, L103. Review of radio observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 1.28±0.10 Jy) including polarisation and review of flux densities.

## G16.4–0.5

**RA:** $18^h22^m38^s$ **1-GHz flux/Jy:** 4.6 **Size/arcmin:** 13
**Dec:** –14°55′ **Spectral index:** 0.3? **Type:** S

Has been called G16.41–0.55.

**Radio:** Partial shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 10.0±0.3 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 3.0±0.3 Jy) including polarisation and review of flux densities.

## G16.7+0.1

**RA:** $18^h20^m56^s$ **1-GHz flux/Jy:** 3.0 **Size/arcmin:** 4
**Dec:** $-14°20'$ **Spectral index:** 0.6 **Type:** C

Has been called G16.73+0.08.

**Radio:** Asymmetric shell with flat-spectrum core.
**X-ray:** Non-thermal core.

**References:**

Helfand *et al.* 1989, ApJ, 341, 151. VLA at 5 GHz (5 : $S$ = 0.95 Jy) and 1.4 GHz (15″ : $S$ = 2.43 Jy) and Ooty at 327 MHz ($S$ = 5.13 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations, including masers.
Reynoso & Mangum 2000, ApJ, 545, 874. CO observations of surroundings.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Helfand *et al.* 2003, ApJ, 592, 941. XMM observations.
Bock & Gaensler 2005, ApJ, 626, 343. BIMA at 88.6 GHz (19″×25″).
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Bhatnagar *et al.* 2011, ApJ, 739, L20. VLA at 6 GHz.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 1.23±0.11 Jy) including polarisation and review of flux densities.

## G17.0−0.0

**RA:** $18^h21^m57^s$ **1-GHz flux/Jy:** 0.5 **Size/arcmin:** 5
**Dec:** $-14°08'$ **Spectral index:** 0.5 **Type:** S

Has been called G17.02–0.04.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 0.7±0.1 Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.

## G17.4−2.3

**RA:** $18^h30^m55^s$ **1-GHz flux/Jy:** 5 **Size/arcmin:** 24?
**Dec:** $-14°52'$ **Spectral index:** 0.5? **Type:** S

**Radio:** Incomplete, poorly defined shell.
**Optical:** Filaments to SE, and diffuse emission.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Boumis *et al.* 2002, A&A, 385, 1042. Optical observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 2.3±0.2 Jy) including polarisation and review of flux densities.

## G17.4−0.1

**RA:** $18^h23^m08^s$ **1-GHz flux/Jy:** 0.4 **Size/arcmin:** 6
**Dec:** $-13°46'$ **Spectral index:** 0.7 **Type:** S

Has been called G17.48–0.12.

**Radio:** Partial shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 0.9±0.1 Jy), plus other observations.

## G17.8−2.6

**RA:** $18^h32^m50^s$ **1-GHz flux/Jy:** 5 **Size/arcmin:** 24
**Dec:** −14°39′ **Spectral index:** 0.5 **Type:** S

**Radio:** Well defined shell.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 2.23\pm0.13$ Jy) including polarisation and review of flux densities.

## G18.1−0.1

**RA:** $18^h24^m34^s$ **1-GHz flux/Jy:** 4.6 **Size/arcmin:** 8
**Dec:** −13°11′ **Spectral index:** 0.5 **Type:** S

Has been called G18.1–0.2 and G18.16–0.16.

**Radio:** Shell.

**X-ray:** Detected.

**Distance:** Association with other sources suggests 4 kpc.

**References:**

Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz (8′).
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA observations.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 7.6\pm0.1$ Jy), plus other observations.
Hewitt & Yusef-Zadeh 2009, ApJ, 694, L16. OH maser search.
Paron *et al.* 2013, MNRAS, 433, 1619. CO, optical and other observations of region.

## G18.6−0.2

**RA:** $18^h25^m55^s$ **1-GHz flux/Jy:** 1.4 **Size/arcmin:** 6
**Dec:** −12°50′ **Spectral index:** 0.4 **Type:** S

Has been called G18.62–0.28.

**Radio:** Partial shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S = 1.9\pm0.1$ Jy), plus other observations.

## G18.8+0.3 Kes 67

**RA:** $18^h23^m58^s$ **1-GHz flux/Jy:** 33 **Size/arcmin:** 17×11
**Dec:** −12°23′ **Spectral index:** 0.46 **Type:** S

Has been called G18.9+0.3.

**Radio:** Incomplete shell, in complex region near the HII region W39.

**Distance:** Association with molecular cloud and HI absorption suggests 12 kpc.

**References:**

Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : $S = 17\pm7$ Jy).
Clark *et al.* 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : $S = 38$ Jy).
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Milne *et al.* 1989, PASA, 8, 187. Parkes 64-m at 8.4 GHz (3′.0 : $S = 12.9\pm1.0$ Jy), including polarisation.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (2′.9×3′.5 : $S = 55$ Jy).
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 1.4 GHz (75″×55″ : $S = 29.9\pm0.3$ Jy).
Dubner *et al.* 1999, AJ, 118, 930. Parkes 64-m at 1.6 GHz (15″) for HI, VLA at 1.6 GHz (17″×12″) for OH, plus CO observations.
Dubner *et al.* 2004, A&A, 426, 201. CO observations of environment.
Tian *et al.* 2007, A&A, 474, 541. VGPS at 1.4 GHz (1′) including HI, plus CO observations of region.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 15.3\pm0.9$ Jy) including polarisation and review of flux densities.
Vasquez *et al.* 2012, A&A, 545, A89. CO observations of region.
Paron *et al.* 2012, A&A, 547, A60. CO and other molecular observations of region.

## G18.9–1.1

**RA:** $18^h29^m50^s$ **1-GHz flux/Jy:** 37 **Size/arcmin:** 33
**Dec:** $-12°58'$ **Spectral index:** 0.39 **Type:** C?

Has been called G18.95–1.1 and G18.94–1.04.

**Radio:** Non-thermal, diffuse partially limb-brightened, with central ridge.
**Optical:** Detected.
**X-ray:** Partial shell.
**Point sources:** Compact X-ray source, with diffuse nebula.
**Distance:** Various observations suggest 2 kpc.

**References:**


Fürst *et al.* 1985, Nature, 314, 720. Effelsberg 100-m at 4.75 GHz ($2'.4 : S = 23.8$ Jy), plus other flux densities.
Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz ($7'.2 \times 8' : S = 82 \pm 15$ Jy), plus review of flux densities.
Barnes & Turtle 1988, IAUCo, 101, 347. Molonglo at 408 MHz ($2'.9 \times 3'.1 : S = 58 \pm 9$ Jy) and Parkes 64-m at 5 GHz ($4'.4 \times 4'.1 : S = 23 \pm 6$ Jy).
Patnaik *et al.* 1988, Nature, 332, 136. Ooty at 327 MHz ($0'.6 \times 1'.6$).
Fürst *et al.* 1989, A&A, 209, 361. Effelsberg 100-m at 4.75 GHz ($2'.45 : S = 23.8$ Jy) and VLA at 1.5 and 4.9 GHz ($19'' \times 14''$), and Effelsberg 100-m at 1.4 GHz ($9'$) for HI.
Aschenbach *et al.* 1991, A&A, 246, L32. ROSAT observations.
Fürst *et al.* 1997, A&A, 319, 655. ROSAT observations, and Effelsberg 100-m at 10.6 GHz ($1'.1$).
Reich 2002, in NSPS, p1. Effelsberg 100-m at 10.6 GHz, including polarisation.
Harrus *et al.* 2004, ApJ, 603, 152. ROSAT and ASCA observations.
Tüllmann *et al.* 2010, ApJ, 720, 848. Chandra detection of compact source.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5 : S = 19.6 \pm 1.0$ Jy) including polarisation and review of flux densities.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.


## G19.1+0.2

**RA:** $18^h24^m56^s$ **1-GHz flux/Jy:** 10 **Size/arcmin:** 27
**Dec:** $-12°07'$ **Spectral index:** 0.5 **Type:** S

Has been called G19.15+0.27.

**Radio:** Partial shell.

**References:**


Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz ($42'' : S = 17.4 \pm 0.4$ Jy), plus other observations.


## G20.0–0.2

**RA:** $18^h28^m07^s$ **1-GHz flux/Jy:** 10 **Size/arcmin:** 10
**Dec:** $-11°35'$ **Spectral index:** 0.1 **Type:** F

**Radio:** Faint, filled-centre, polarised.
**X-ray:** Centrally brightened.
**Point sources:** OH source 20.1–0.1 is nearby.

**References:**


Becker & Helfand 1985, ApJ, 297, L25. VLA at 1.4 and 5 GHz ($12''$).
Odegard 1986, AJ, 92, 1372. TPT at 57.5 MHz ($7'.2 \times 8' : S = 8.5 \pm 2$ Jy), plus review of flux densities.
Junkes *et al.* 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz ($4'.3$), including polarisation.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5 : S = 9.2 \pm 0.5$ Jy) including polarisation and review of flux densities.
Petriella *et al.* 2013, A&A, 554, A73. Chandra observations, plus CO and HI observations of region.

## G20.4+0.1

**RA:** $18^h27^m51^s$ **1-GHz flux/Jy:** 9? **Size/arcmin:** 8
**Dec:** $-11°00'$ **Spectral index:** 0.1? **Type:** S?

Has been called G20.47+0.16.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz ($42'' : S = 4.2\pm0.1$ Jy), plus other observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5 : S = 7.5\pm0.5$ Jy) including polarisation and review of flux densities.

## G21.0−0.4

**RA:** $18^h31^m12^s$ **1-GHz flux/Jy:** 1.1 **Size/arcmin:** 9×7
**Dec:** $-10°47'$ **Spectral index:** 0.6 **Type:** S

Has been called G21.04–0.47.

**Radio:** Shell.

**References:**

Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz ($42'' : S = 2.3\pm0.2$ Jy), plus other observations.

## G21.5−0.9

**RA:** $18^h33^m33^s$ **1-GHz flux/Jy:** 7 **Size/arcmin:** 5
**Dec:** $-10°35'$ **Spectral index:** varies **Type:** C

Early observations relate to the central core only.

**Radio:** Filled-centre, with high frequency turnover.

**X-ray:** Central core, with extended, faint halo.

**Point sources:** Central pulsar.

**Distance:** HI absorption indicates 4.6 kpc.

**References:**

Wilson & Weiler 1976, A&A, 53, 89. WSRT at 5 GHz ($6''\times35''$).
Becker & Kundu 1976, ApJ, 204, 427. NRAO interferometer at 2.7 GHz ($20''\times5''$) and 8 GHz ($7''\times2''$), plus review of flux densities.
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz ($2'.6$).
Becker & Szymkowiak 1981, ApJ, 248, L23. VLA at 5 GHz ($8''$), and Einstein observations.
Davelaar *et al.* 1986, ApJ, 300, L59. EXOSAT X-ray spectrum, and VLA HI observations.
Morsi & Reich 1987, A&AS, 69, 533. Effelsberg 100-m at 32 GHz ($26''.5 : S = 5.64\pm0.29$ Jy).
Fürst *et al.* 1988, PASJ, 40, 347. NRO array at 22.3 GHz ($4''.4\times7''.3$).
Junkes *et al.* 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz ($4'.3$), including polarisation.
Salter *et al.* 1989, A&A, 225, 167. Observations at 90.7 ($29''.5 : S = 3.8\pm0.4$ Jy) and 141.9 GHz ($S = 2.5\pm1.2$ Jy).
Salter *et al.* 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz ($S = 3.94\pm0.70$ Jy), plus review of flux densities.
Asaoka & Koyama 1990, PASJ, 42, 625. Ginga X-ray spectrum.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz ($3'.3\times3'.4 : S = 9$ Jy).
Wallace *et al.* 1994, A&A, 286, 565. HI of surroundings.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Slane *et al.* 2000, ApJ, 533, L29. Chandra observations identifying X-ray halo.
Warwick *et al.* 2001, A&A, 365, L248. XMM observations of X-ray halo.
Bock *et al.* 2001, ApJ, 561, L203. BIMA at 94 GHz ($8''.6\times4''.6$).
Safi-Harb *et al.* 2001, ApJ, 561, 308. Chandra and other X-ray observations.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 22 GHz ($8''$) and 32 GHz, including polarisation.
La Palombara & Mereghetti 2002, A&A, 383, 916. XMM upper limit on pulsations.
Bocchino *et al.* 2005, A&A, 442, 539. XMM and Chandra observations.
Gupta *et al.* 2005, Current Science, 89, 853. Pulsar discovery.
Camilo *et al.* 2006, ApJ, 637, 456. Pulsar discovery.
Bietenholz & Bartel 2008, MNRAS, 386, 1411. VLA at 4.75 GHz ($0''.53\times0''.82$) for expansion studies.
Tian & Leahy 2008, MNRAS, 391, L54. VGPS at 1.4 GHz ($1'$) including HI.
Matheson & Safi-Harb 2010, ApJ, 724, 572. Chandra observations.
Bietenholz *et al.* 2011, MNRAS, 412, 1221. VLA at 1.4 GHz ($14''\times18''$).
Bhatnagar *et al.* 2011, ApJ, 739, L20. VLA at 6 GHz.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5 : S = 6.5\pm0.4$ Jy) including polarisation and review of flux densities.
Zajczyk *et al.* 2012, A&A, 542, A12. IR observations, including polarisation.

## G21.5–0.1

**RA:** $18^h30^m50^s$ **1-GHz flux/Jy:** 0.4 **Size/arcmin:** 5
**Dec:** –10°09′ **Spectral index:** 0.5 **Type:** S

Has been called G21.56–0.10.

**Radio:** Partial shell.

**X-ray:** Detected.

**References:**

Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA observations.
Brogan *et al.* 2006, ApJ, 639, L25. VLA at 330 MHz (42″ : $S$ = 0.5±0.1 Jy), plus other observations.

## G21.6–0.8

**RA:** $18^h33^m40^s$ **1-GHz flux/Jy:** 1.4 **Size/arcmin:** 13
**Dec:** –10°25′ **Spectral index:** 0.5? **Type:** S

Has been called G21.64–0.84.

**Radio:** Faint, irregular shell.

**References:**

Bietenholz *et al.* 2011, MNRAS, 412, 1221. VLA at 327 MHz (85″ : $S$ = 2.8 Jy) and 1.4 GHz (14″×18″).

## G21.8–0.6 Kes 69

**RA:** $18^h32^m45^s$ **1-GHz flux/Jy:** 65 **Size/arcmin:** 20
**Dec:** –10°08′ **Spectral index:** 0.56 **Type:** S

**Radio:** Incomplete shell.

**X-ray:** Detected.

**Distance:** Association with CO indicates 5.2 kpc.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Wilson 1972, A&A, 19, 354. $H_2CO$ absorption.
Kundu *et al.* 1974, AJ, 79, 132. NRAO 140-ft at 5 GHz (6′) and 10 GHz (3′).
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft et 2.7 GHz (5′ : $S$ = 42.3±4.6 Jy).
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8.′4) and 5 GHz (4.′4).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Seward 1990, ApJS, 73, 781. Einstein observations.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′3×3.′5 : $S$ = 132 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations, including masers.
Yusef-Zadeh *et al.* 2003, ApJ, 585, 319. X-ray observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Wood *et al.* 2008, AJ, 135, 2358. VLA at 4.8 GHz, including polarisation.
Tian & Leahy 2008, MNRAS, 391, L54. VGPS at 1.4 GHz (1′) including HI.
Zhou *et al.* 2009, ApJ, 691, 516. CO and $HCO^+$ of region.
Hewitt *et al.* 2009, ApJ, 694, 1266. Spitzer spectroscopy.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 24.0±1.3 Jy) including polarisation and review of flux densities.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.

## G22.7–0.2

**RA:** $18^h33^m15^s$ **1-GHz flux/Jy:** 33 **Size/arcmin:** 26
**Dec:** –09°13′ **Spectral index:** 0.6 **Type:** S?

**Radio:** Non-thermal ring in complex region, overlapping G23.3–0.3.

**Point sources:** Variable radio source near centre.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′3×3.′4 : $S$ = 82 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Becker *et al.* 2010, AJ, 140, 157. Variable radio source detection.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.

## G23.3–0.3 W41

**RA:** $18^h34^m45^s$ **1-GHz flux/Jy:** 70 **Size/arcmin:** 27
**Dec:** –08°48′ **Spectral index:** 0.5 **Type:** S

**Radio:** Distorted ring, in complex region, overlapping G22.7–0.2.
**X-ray:** Possible extended emission, with compact sources.
**Point sources:** Pulsar association suggested.
**Distance:** HI and CO observations indicate 4.2 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′3×3.′4 : $S$ = 138 Jy).
Gaensler & Johnston 1995, MNRAS, 275, L73. Possible pulsar association.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Aharonian *et al.* 2005, Science, 307, 1938. γ-ray detection.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.
Aharonian *et al.* 2006, ApJ, 636, 777. γ-ray observations.
Albert *et al.* 2006, ApJ, 643, L53. γ-ray observations.
Landi *et al.* 2006, ApJ, 651, 190. X-ray observations.
Tian *et al.* 2007, ApJ, 657, L25. VGPS at 1.4 GHz (1′) including HI, plus XMM observations.
Leahy & Tian 2008, AJ, 135, 167. VGPS at 1.4 GHz (1′) including HI, plus CO observations.
Mukherjee *et al.* 2009, ApJ, 691, 1707. XMM and γ-ray observations.
Frail *et al.* 2013, ApJ, 773, L19. OH observations.
Castro *et al.* 2013, ApJ, 774, 36. Fermi observations.


## G23.6+0.3

**RA:** $18^h33^m03^s$ **1-GHz flux/Jy:** 8? **Size/arcmin:** 10?
**Dec:** –08°13′ **Spectral index:** 0.3 **Type:** ?

Has been suggested this is not an SNR.

**Radio:** Not well resolved, in complex region.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Pinheiro Gonçalves *et al.* 2011, AJ, 142, 47. IR observations.


## G24.7–0.6

**RA:** $18^h38^m43^s$ **1-GHz flux/Jy:** 8 **Size/arcmin:** 15?
**Dec:** –07°32′ **Spectral index:** 0.5 **Type:** S?

**Radio:** Incomplete shell, defined in SW.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 12.3 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 3.6 Jy).
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6.′8 : $S$ = 2.2±0.5 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz (44″×56″ : $S$ = 1.9 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.


## G24.7+0.6

**RA:** $18^h34^m10^s$ **1-GHz flux/Jy:** 20? **Size/arcmin:** 30×15
**Dec:** –07°05′ **Spectral index:** 0.2? **Type:** C?

**Radio:** Filled-centre, with faint shell, and a compact HII region to the S.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Reich *et al.* 1984, A&A, 133, L4. Effelsberg 100-m at 2.7 GHz (4.′3 : $S$ = 19±3 Jy) and 4.75 GHz (2.′4 : $S$ = 17±4 Jy) and NRO 45-m at 10.2 GHz (2.′7 : $S$ = 15±3 Jy).
Becker & Helfand 1987, ApJ, 316, 660. VLA at 1.4 GHz (12″), and X-ray upper limit.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.

## G25.1–2.3

**RA:** $18^h45^m10^s$ **1-GHz flux/Jy:** 8 **Size/arcmin:** 80×30?
**Dec:** –08°00′ **Spectral index:** 0.5? **Type:** S

**Radio:** Incomplete shell, extent not well defined.

**References:**

Gao *et al.* 2011, A&A, 532, A144. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 3.7±0.4 Jy), plus other observations.

## G27.4+0.0 4C–04.71

**RA:** $18^h41^m19^s$ **1-GHz flux/Jy:** 6 **Size/arcmin:** 4
**Dec:** –04°56′ **Spectral index:** 0.68 **Type:** S

Early references refer to G27.3–0.1 (Kes 73), a supposed larger remnant.

**Radio:** Incomplete shell.

**X-ray:** Diffuse emission, with central low period pulsar.

**Point sources:** Central AXP.

**Distance:** HI absorption suggests 7.5 to 9.8 kpc.

**References:**

Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′).
Clark *et al.* 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : $S$ = 4.4 Jy).
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′.8 : $S$ = 2.0±0.5 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Caswell *et al.* 1982, MNRAS, 200, 1143. FIRST at 1415 MHz (60″×45″ : $S$ = 3.5 Jy). Revise $S_{408\ \mathrm{MHz}}$ = 10.4 Jy, and $S_{5\ \mathrm{GHz}}$ = 1.9±0.2 Jy.
Kriss *et al.* 1985, ApJ, 288, 703. Einstein observations, plus VLA at 1.4 and 5 GHz (12″).
Sanbonmatsu & Helfand 1992, AJ, 104, 2189. VLA at 1.4 GHz for HI absorption.
Helfand *et al.* 1994, ApJ, 434, 627. ROSAT observations, particularly of central source.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations, including nearby masers.
Vasisht & Gotthelf 1997, ApJ, 486, L129. ASCA detection of pulsar.
Gotthelf & Vasisht 1997, ApJ, 486, L133. ASCA observations.
Gotthelf *et al.* 1999, ApJ, 522, L49. X-ray timing observations of pulsar.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Mereghetti *et al.* 2001, MNRAS, 321, 143. Search for optical/IR counterpart to pulsar.
Kuiper *et al.* 2004, ApJ, 613, 1173. X-ray observations of pulsar.
Tian & Leahy 2008, ApJ, 677, 292. VGPS at 1.4 GHz (1′) including HI.
Mizuno *et al.* 2010, AJ, 139, 1542. Spitzer observations.
An *et al.* 2013, ApJ, 779, 163. NuSTAR and γ-ray observations.

## G27.8+0.6

**RA:** $18^h39^m50^s$ **1-GHz flux/Jy:** 30 **Size/arcmin:** 50×30
**Dec:** –04°24′ **Spectral index:** varies **Type:** F

**Radio:** Filled-centre, with spectral turnover.

**X-ray:** Possible pulsar wind nebula.

**References:**

Reich *et al.* 1984, A&A, 133, L4. Effelsberg 100-m at 2.7 GHz (4′.3 : $S$ = 23±2 Jy), and 4.75 GHz (2′.4 : $S$ = 18±2 Jy) and NRO 45-m at 10.2 GHz (smoothed to 4′.3 : $S$ = 8.5±2 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Misanovic *et al.* 2010, ApJ, 725, 931. XMM pulsar/wind nebula search.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 21.0±1.1 Jy) including polarisation and review of flux densities.

## G28.6−0.1

**RA:** $18^h43^m55^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 13×9
**Dec:** –03°53′ **Spectral index:** ? **Type:** S

**Radio:** Poorly defined regions of non-thermal emission.
**X-ray:** Diffuse shell, with thermal and non-thermal emission.

**References:**
Helfand *et al.* 1989, ApJ, 341, 151. VLA at 1.4 GHz (15″) and 5 GHz (15″).
Bamba *et al.* 2001, PASJ, 53, L21. ASCA observations.
Ueno *et al.* 2003, ApJ, 588, 338. Chandra observations.
Ebisawa *et al.* 2005, ApJ, 635, 214. Chandra observations.

## G28.8+1.5

**RA:** $18^h39^m00^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 100?
**Dec:** –02°55′ **Spectral index:** 0.4? **Type:** S?

**Radio:** Part of rim detected.
**X-ray:** Diffuse, Centrally brightened.

**References:**
Schwentker 1994, A&A, 286, L47. ROSAT observations.
Song *et al.* 2000, PASJ, 52, 181. ASCA observations.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Misanovic *et al.* 2010, ApJ, 725, 931. XMM pulsar/wind nebula search.

## G29.6+0.1

**RA:** $18^h44^m52^s$ **1-GHz flux/Jy:** 1.5? **Size/arcmin:** 5
**Dec:** –02°57′ **Spectral index:** 0.5? **Type:** S

**Radio:** Diffuse shell.
**Point sources:** AXP associated.

**References:**
Gaensler *et al.* 1999, ApJ, 526, L37. VLA at 5 GHz (13″) and 8 GHz (8″)
Vasisht *et al.* 2000, ApJ, 542, L49. X-ray observations of AXP.

## G29.7−0.3 Kes 75

**RA:** $18^h46^m25^s$ **1-GHz flux/Jy:** 10 **Size/arcmin:** 3
**Dec:** –02°59′ **Spectral index:** 0.63 **Type:** C

Has erroneously been called G29.6+0.1.

**Radio:** Shell with flatter spectrum emission from centre.
**X-ray:** Thermal shell and non-thermal core, and central pulsar.
**Point sources:** X-ray pulsar.
**Distance:** Association with CO implies 11 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Milne & Dickel 1974, AuJPh, 27, 549. Parkes 64-m at 2.7 GHz (8.′4 : $S$ = 5±20% Jy).
Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
Becker & Kundu 1976, ApJ, 204, 427. NRAO interferometer at 2.7 GHz (20″×7″) and 8 GHz (25″×8″), plus review of flux densities.
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Becker *et al.* 1983, ApJ, 268, L93. VLA at 1.4 GHz (3″), plus Einstein observations.
Becker & Helfand 1984, ApJ, 283, 154. VLA at 5 GHz (2.″6), plus HI.
Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (26.″5 : $S$ = 1.02±0.07 Jy).
Salter *et al.* 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz of core, plus review of flux densities.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′4×3.′7 : $S$ = 27.4 Jy).
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Blanton & Helfand 1996, ApJ, 470, 961. ASCA observations.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Gotthelf *et al.* 2000, ApJ, 542, L37. X-ray pulsar detection.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Mereghetti *et al.* 2002, ApJ, 574, 873. BeppoSAX observations of pulsar.
Helfand *et al.* 2003, ApJ, 582, 783. Chandra observations.
Bock & Gaensler 2005, ApJ, 626, 343. BIMA at 88.6 GHz (10″×13″).
Morton *et al.* 2007, ApJ, 667, 219. Spitzer and Chandra observations.
McBride *et al.* 2008, A&A, 477, 249. γ-ray and Chandra observations.
Leahy & Tian 2008, A&A, 480, L25. VGPS at 1.4 GHz (1′) including HI.
Kumar & Safi-Harb 2008, ApJ, 678, L43. Chandra observations.
Ng *et al.* 2008, ApJ, 686, 508. Chandra observations.
Gavriil *et al.* 2008, Science, 319, 1802. X-ray observations of pulsar.
Su *et al.* 2009, ApJ, 694, 376. CO observations of region, plus Chandra observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 3.6±0.6 Jy) including polarisation and review of flux densities.


## G30.7−2.0

**RA:** $18^h54^m25^s$ **1-GHz flux/Jy:** 0.5? **Size/arcmin:** 16
**Dec:** –02°54′ **Spectral index:** 0.7? **Type:** ?

**Radio:** Poorly defined.

**References:**


Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4.′3).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.


## G30.7+1.0

**RA:** $18^h44^m00^s$ **1-GHz flux/Jy:** 6 **Size/arcmin:** 24×18
**Dec:** –01°32′ **Spectral index:** 0.4 **Type:** S?

**Radio:** Non-thermal, highly polarised part shell?
**Point sources:** Compact source near centre.

**References:**


Reich *et al.* 1986, A&A, 155, 185. Effelsberg 100-m at 4.75 GHz (2.′4 : $S$ = 3.4±0.4 Jy), plus other flux densities.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′6×3.′9 : $S$ = 8.6 Jy).
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 2.93±0.19 Jy) including polarisation and review of flux densities.

## G31.5−0.6

**RA:** $18^h51^m10^s$ **1-GHz flux/Jy:** 2? **Size/arcmin:** 18?
**Dec:** –01°31′ **Spectral index:** ? **Type:** S?

Has been called G31.55–0.65.

**Radio:** Distorted shell? near HII region.
**Optical:** Diffuse, incomplete shell.

**References:**

Fürst *et al.* 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′.4), plus other flux densities.
Mavromatakis *et al.* 2001, A&A, 370, 265. Optical observations.

## G31.9+0.0 3C391

**RA:** $18^h49^m25^s$ **1-GHz flux/Jy:** 25 **Size/arcmin:** 7×5
**Dec:** –00°55′ **Spectral index:** varies **Type:** S

**Radio:** Shell, brightest in NW, with low frequency turnover.
**X-ray:** Diffuse with central core.
**Distance:** HI absorption is seen to the tangent point (8.5 kpc).

**References:**

Radhakrishnan *et al.* 1972, ApJS, 24, 49. HI absorption.
Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
Green *et al.* 1975, A&A, 44, 187. Effelsberg 100-m at 15 GHz (58″ : $S > 1.6$).
Becker & Kundu 1976, ApJ, 204, 427. NRAO interferometer at 2.7 GHz (20″×23″) and 8 GHz (24″×9″), plus review of flux densities.
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Goss *et al.* 1979, A&A, 78, 75. FIRST at 1.4 GHz (54″×66″ : $S = 20\pm2$ Jy) and Effelsberg 100-m at 10.7 GHz (77″ : $S = 7.5\pm0.8$ Jy).
Wang & Seward 1984, ApJ, 279, 705. Einstein observations.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.4×3′.7 : $S =$ 44.8 Jy).
Reynolds & Moffett 1993, AJ, 105, 2226. VLA at 1.4 GHz (6″), including possible associated CO.
Moffett & Reynolds 1994, ApJ, 425, 668. VLA at 330 MHz (smoothed to 30″ : $S = 38.5\pm0.5$ Jy) 1.46 GHz (6″.7) and 4.85 GHz (6″.2×6″.4), including spectral index and polarisation studies.
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant, including masers.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Reach & Rho 1996, A&A, 315, L277. ISO spectroscopy.
Rho & Petre 1996, ApJ, 467, 698. ROSAT observations.
Wilner *et al.* 1998, AJ, 115, 247. CO observations of surroundings.
Reach & Rho 1998, ApJ, 507, L93. ISO observations.
Reach & Rho 1999, ApJ, 511, 836. CO, $HCO^+$ and CS observations of surroundings.
Reach & Rho 2000, ApJ, 544, 843. ISO observations of interactions with surroundings.
*see also:* Reach & Rho 2001, ApJ, 558, 943. Erratum.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Chen & Slane 2001, ApJ, 563, 202. ASCA observations.
Reach *et al.* 2002, ApJ, 564, 302. Observations of shocked molecular species.
Chen *et al.* 2004, ApJ, 616, 885. Chandra observations.
Brogan *et al.* 2005, AJ, 130, 148. VLA at 74 MHz, 330 MHz and 1.5 GHz (70″).
Kawasaki *et al.* 2005, ApJ, 631, 935. ASCA observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Neufeld *et al.* 2007, ApJ, 664, 890. Spitzer observations.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Castro & Slane 2010, ApJ, 717, 372. Fermi observations.
Yuan & Neufeld 2011, ApJ, 726, 76. Spitzer observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 8.9\pm0.6$ Jy) including polarisation and review of flux densities.

## G32.0−4.9 3C396.1

**RA:** $19^h06^m00^s$ **1-GHz flux/Jy:** 22? **Size/arcmin:** 60?
**Dec:** –03°00′ **Spectral index:** 0.5? **Type:** S?

**Radio:** Possible large shell?

**References:**

Milne & Hill 1969, AuJPh, 22, 211. Parkes 64-m at 635 MHz (31′ : $S = 25\pm30\%$ Jy), 1410 MHz (15′ : $S = 19\pm15\%$ Jy) and 2650 MHz (8′.4 : $S = 8.6\pm30\%$ Jy). Fluxes if size is 60', plus review of flux densities.
Caswell 1970, AuJPh, 23, 105. Revision of low frequency flux densities.
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo at 111 MHz ($S =$ $105\pm30$ Jy).

## G32.1–0.9

**RA:** $18^h53^m10^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 40?
**Dec:** –01°08′ **Spectral index:** ? **Type:** C?

**Radio:** Possible faint shell, not well defined.
**X-ray:** Diffuse, with clumps.

**References:**
Folgheraiter *et al.* 1997, MNRAS, 292, 365. ROSAT and ASCA observations.

## G32.4+0.1

**RA:** $18^h50^m05^s$ **1-GHz flux/Jy:** 0.25? **Size/arcmin:** 6
**Dec:** –00°25′ **Spectral index:** ? **Type:** S

Has been called G32.45+0.1.

**Radio:** Shell.
**X-ray:** Shell.
**Distance:** X-ray absorption suggests 17 kpc.

**References:**
Yamaguchi *et al.* 2004, PASJ, 56, 1059. XMM and other observations.
Ueno *et al.* 2005, in XRRC, E4.18. XMM observations.

## G32.8–0.1 Kes 78

**RA:** $18^h51^m25^s$ **1-GHz flux/Jy:** 11? **Size/arcmin:** 17
**Dec:** –00°08′ **Spectral index:** 0.2? **Type:** S?

Part has been called G33.1–0.1.

**Radio:** Elongated shell?
**Optical:** Detected.
**X-ray:** NE rim detected.
**Distance:** Association with CO indicates 4.8 kpc.

**References:**
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft et 2.7 GHz (5′ : $S = 7.2 \pm 0.5$ Jy).
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo at 430 MHz ($S = 19.0 \pm 15.5$ Jy).
Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S = 12.8$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 7.7$ Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′6×3.′8 : $S =$ 31.3 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA detection of compact OH emission.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.
Zhou & Chen 2011, ApJ, 743, 4. XMM observations, plus CO of region.

## G33.2–0.6

**RA:** $18^h53^m50^s$ **1-GHz flux/Jy:** 3.5 **Size/arcmin:** 18
**Dec:** –00°02′ **Spectral index:** varies **Type:** S

**Radio:** Incomplete shell.
**Optical:** Filaments and diffuse emission.

**References:**
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Reich 1982, A&A, 106, 314. Effelsberg 100-m at 2.7 GHz (4.′4 : $S = 2.6 \pm 0.3$ Jy) and 4.75 GHz (2.′5 : $S = 1.75 \pm 0.2$ Jy).
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 1.4 GHz (68″×52″ : $S = 2.7 \pm 0.3$ Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Boumis *et al.* 2009, A&A, 499, 789. Optical observations.

## G33.6+0.1 Kes 79, 4C00.70, HC13

**RA:** $18^h52^m48^s$ **1-GHz flux/Jy:** 20 **Size/arcmin:** 10
**Dec:** +00°41′ **Spectral index:** 0.51 **Type:** S

Has been called G33.7+0.0.

**Radio:** Shell, with bright central region, in complex region.
**X-ray:** Multiple shells and filaments.
**Point sources:** Central X-ray pulsar.
**Distance:** HI absorption gives about 7.8 kpc.

**References:**


Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S$=35.5 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=7.8 Jy).
Caswell *et al.* 1975, A&A, 45, 239. HI absorption.
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430\ MHz}$ = 69±33 Jy.
Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′ : $S$=6.8±1.5 Jy).
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6.′8 : $S$=11.4±1.1 Jy).
Caswell *et al.* 1981, MNRAS, 195, 89. FIRST at 1415 MHz (1′), plus observations of the nearby point source.
van Gorkom *et al.* 1982, MNRAS, 198, 757. WSRT HI absorption to nearby point source, possibly extragalactic.
Seaquist & Gilmore 1982, AJ, 87, 378. VLA observations of nearby source, plus Einstein observations.
Green 1989, MNRAS, 238, 737. OH absorption.
Frail & Clifton 1989, ApJ, 336, 854. VLA at 1.4 GHz (1′×2.′9), including HI absorption.
Velusamy *et al.* 1991, AJ, 102, 676. VLA at 327 MHz (1′), 1.5 (7″×14″) and 5 GHz (7″), including spectral comparison.
Green & Dewdney 1992, MNRAS, 254, 686. Observations of adjacent molecular material.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′6×3.′8 : $S$ = 34.8 Jy).
Seward & Velusamy 1995, ApJ, 439, 715. ROSAT observations.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Tsunemi & Enoguchi 2002, PASJ, 54, 735. ASCA observations.
Seward *et al.* 2003, ApJ, 584, 414. Chandra observations.
Stanimirović 2003, ApJ, 592, 953. Arecibo OH absorption.
Sun *et al.* 2004, ApJ, 605, 742. Chandra observations.
Gotthelf *et al.* 2005, ApJ, 627, 390. XMM pulsar detection.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.
Halpern *et al.* 2007, ApJ, 665, 1304. X-ray pulsar timing observations.
Giacani *et al.* 2009, A&A, 507, 841. VLA at 74 MHz (36″×39″ : $S$ = 76±10 Jy), 324 MHz (13″ : $S$ = 39±8 Jy) and 1.5 GHz (17″×19″ : $S$=11.5±1.5 Jy), plus review of flux densities and XMM observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 9.4±0.5 Jy) including polarisation and review of flux densities.

## G34.7−0.4 W44, 3C392

**RA:** $18^h56^m00^s$ **1-GHz flux/Jy:** 250 **Size/arcmin:** 35×27
**Dec:** +01°22′ **Spectral index:** 0.37 **Type:** C

Has been called G34.6–0.5.

**Radio:** Distorted shell, brighter to the E, with pulsar and associated nebula.
**Optical:** Diffuse emission.
**X-ray:** Centrally concentrated, thermal spectrum, plus pulsar wind nebula.
**Point sources:** Pulsar within the boundary of the remnant.
**Distance:** HI absorption indicates 2.8 kpc.

**References:**


Kundu & Velusamy 1972, A&A, 20, 237. NRAO 140-ft at 10.7 GHz (3′ : $S$ = 105±7 Jy).
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 177±10 Jy).
Caswell *et al.* 1975, A&A, 45, 239. HI absorption.
Clark *et al.* 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : $S$ = 299 Jy).
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430\ \mathrm{MHz}}$ = 540±187 Jy.
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8.′4) and 5 GHz (4.′4).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Smith *et al.* 1985, MNRAS, 217, 99. Einstein observations.
Wolszczan *et al.* 1991, ApJ, 372, L99. Pulsar detection.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′6×3.′8 : $S$ = 469 Jy).
Jones *et al.* 1993, MNRAS, 265, 631. VLA at 1.4 GHz (15″), plus X-ray spectra.
Rho *et al.* 1994, ApJ, 430, 757. Optical and ROSAT observations.
Koo & Heiles 1995, ApJ, 442, 679. HI of surrounding shell.
Esposito *et al.* 1996, ApJ, 461, 820. Possible associated γ-ray emission.
Harrus *et al.* 1996, ApJ, 464, L161. ASCA observations.
Frail *et al.* 1996, ApJ, 464, L165. VLA at 1.5 and 8.4 GHz (8.″9×7.″8) of pulsar nebula.
Frail *et al.* 1996, AJ, 111, 1651. OH maser emission.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Reach & Rho 1996, A&A, 315, L277. ISO spectroscopy.
Harrus *et al.* 1997, ApJ, 488, 781. X-ray observations.
Claussen *et al.* 1997, ApJ, 489, 143. VLA of associated OH masers.
Giacani *et al.* 1997, AJ, 113, 1379. VLA at 1.4 GHz (15″), plus optical images.
Seta *et al.* 1998, ApJ, 505, 286. CO observations of surroundings.
Cox *et al.* 1999, ApJ, 524, 179. Revision of distance.
Reach & Rho 2000, ApJ, 544, 843. ISO observations of interactions with surroundings.
*see also:* Reach & Rho 2001, ApJ, 558, 943. Erratum.
Roberts *et al.* 2001, ApJS, 133, 451. ASCA observations.
Petre *et al.* 2002, ApJ, 579, 404. Chandra observations of pulsar and wind nebula.
Mavromatakis *et al.* 2003, A&A, 405, 591. Optical observations.
Shelton *et al.* 2004, ApJ, 611, 906. Chandra observations of part.
Reach *et al.* 2005, ApJ, 618, 297. Molecular line and near-IR observations.
Hoffman *et al.* 2005, ApJ, 627, 803. Observations of OH masers.
Kawasaki *et al.* 2005, ApJ, 631, 935. ASCA observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Neufeld *et al.* 2007, ApJ, 664, 890. Spitzer observations.
Castelletti *et al.* 2007, A&A, 471, 537. VLA at 74 MHz (36″×39″ : $S$ = 634±70 Jy) and 324 MHz (13″ : $S$ = 411±50 Jy).
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Abdo *et al.* 2010, Science, 327, 1103. Fermi observations.
Yuan & Neufeld 2011, ApJ, 726, 76. Spitzer observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 118±6 Jy) including polarisation and review of flux densities.
Giuliani *et al.* 2011, ApJ, 742, L30. γ-ray observations.
Uchiyama *et al.* 2012, ApJ, 749, L35. Fermi observations.
Uchida *et al.* 2012, PASJ, 64, 141. Suzaku observations.
Ackermann *et al.* 2013, Science, 339, 807. Fermi observations.
Yoshiike *et al.* 2013, ApJ, 768, 179. CO and HI observations of region.
Sashida *et al.* 2013, ApJ, 774, 10. $HCO^+$ and CO observations of region.
Park *et al.* 2013, ApJ, 777, 14. Arecibo HI observations of region.


## G35.6−0.4

**RA:** $18^h57^m55^s$ **1-GHz flux/Jy:** 9 **Size/arcmin:** 15×11
**Dec:** +02°13′ **Spectral index:** 0.5 **Type:** S?

Re-identified as SNR in 2009.

**Radio:** Diffuse, with some limb brightening.

**References:**


Green 2009, MNRAS, 399, 177. Identification in the radio as a SNR.
Paron & Giacani 2010, A&A, 509, L4. CO and IR observations of region.
Zhu *et al.* 2013, ApJ, 775, 95. HI and other observations.

## G36.6−0.7

**RA:** $19^h00^m35^s$ **1-GHz flux/Jy:** 1.0 **Size/arcmin:** 25?
**Dec:** +02°56′ **Spectral index:** 0.7? **Type:** S?

**Radio:** polarised arc, possibly part of a larger shell?

**References:**

Fürst *et al.* 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′.4), plus other flux densities.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.4×3′.7 : $S$ = 6.7 Jy).
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 0.39 \pm 0.04$ Jy) including polarisation and review of flux densities.

## G36.6+2.6

**RA:** $18^h48^m49^s$ **1-GHz flux/Jy:** 0.7? **Size/arcmin:** 17×13?
**Dec:** +04°26′ **Spectral index:** 0.5? **Type:** S

**Radio:** Poorly resolved shell.

**References:**

Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).

## G38.7−1.3

**RA:** $19^h06^m40^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 32×19?
**Dec:** +04°28′ **Spectral index:** ? **Type:** S

G38.7–1.4 refers to the E portion.

**Radio:** Incomplete shell.

**Optical:** Arc of filaments, brighter to E.

**X-ray:** Detected in E.

**References:**

Schaudel *et al.* 2002, ASPC, 271, 391. ROSAT observations of E.
Sabin *et al.* 2013, MNRAS, 431, 279. Hα and radio survey observations.

## G39.2–0.3 3C396, HC24, NRAO 593

**RA:** $19^h04^m08^s$ **1-GHz flux/Jy:** 18 **Size/arcmin:** 8×6
**Dec:** +05°28′ **Spectral index:** 0.34 **Type:** C

**Radio:** Shell, brighter to W, with faint 'tail' to E.
**X-ray:** Diffuse, brighter to W, with central core.
**Point sources:** Central X-ray source.
**Distance:** HI absorption suggests > 7.7 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′).
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430\ MHz}$ = 54±38 Jy.
Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′ : $S$ = 4.1±1.0 Jy).
Caswell *et al.* 1975, A&A, 45, 239. HI absorption.
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Caswell *et al.* 1982, MNRAS, 200, 1143. FIRST at 1.4 GHz (65″×48″).
Becker & Helfand 1987, AJ, 94, 1629. VLA at 1.4 GHz (12″ : $S$ = 14 Jy) and 5 GHz, plus Einstein observations.
Patnaik *et al.* 1990, A&A, 232, 467. VLA at 1.5 GHz (25″) and 1.4 GHz (7.″8×7.″5) and 5 GHz (25″) including polarisation, plus Ooty at 327 MHz (100″×31″), including review of flux densities.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′5×3.′6 : $S$ = 42.5 Jy).
Anderson & Rudnick 1993, ApJ, 408, 514. VLA at 1.45 and 4.89 GHz for spectral index studies.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.
Harrus & Slane 1999, ApJ, 516, 811. ASCA observations.
Aharonian *et al.* 2001, A&A, 375, 1008. Limit on high energy γ-rays.
Olbert *et al.* 2003, ApJ, 592, L45. Chandra observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Scaife *et al.* 2007, MNRAS, 377, L69. 33 GHz observations.
Hewitt *et al.* 2009, ApJ, 694, 1266. Spitzer spectroscopy.
Lee *et al.* 2009, ApJ, 691, 1042. IR observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 8.8±0.5 Jy) including polarisation and review of flux densities.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.
Su *et al.* 2011, ApJ, 727, 43. Chandra and CO observations of region.


## G39.7–2.0 W50, SS433

**RA:** $19^h12^m20^s$ **1-GHz flux/Jy:** 85? **Size/arcmin:** 120×60
**Dec:** +04°55′ **Spectral index:** 0.7? **Type:** ?

Eastern part has been called G40.0–3.1. Is this a SNR?

**Radio:** Elongated shell, containing SS433, adjacent to the HII region S74.
**Optical:** Faint filaments at the edge of the radio emission.
**X-ray:** Emission from SS433 and two lobes.
**Point sources:** SS433 is the compact source in the centre of the W50.
**Distance:** HI absorption indicates 6.0±0.5 kpc.

**References:**


van den Bergh 1980, ApJ, 236, L23. Optical in Hα and [SII].
Zealey *et al.* 1980, MNRAS, 192, 731. Optical spectra.
van Gorkom *et al.* 1982, MNRAS, 198, 757. WSRT HI absorption to nearby point source (not SS433).
Seaquist & Gilmore 1982, AJ, 87, 378. VLA observations of nearby source.
Watson *et al.* 1983, ApJ, 273, 688. X-ray observations.
Downes *et al.* 1986, MNRAS, 218, 393. Effelsberg 100-m at 4.75 GHz (2.′4 : $S$ = 34±4 Jy), plus previous 1.7 and 2.7 GHz data.
Romney *et al.* 1987, ApJ, 321, 822. VLBI of SS433, including distance.
Elston & Baum 1987, AJ, 94, 1633. Mosaic with VLA at 1.4 GHz (30″) of fine structure only.
Kawai *et al.* 1989, PASJ, 41, 491. X-ray observations of SS433.
Band 1989, ApJ, 336, 937. Einstein and EXOSAT observations.
Yamauchi *et al.* 1994, PASJ, 46, L109. X-ray spectral observations.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Brinkmann *et al.* 1996, A&A, 312, 306. ROSAT observations.
Kotani *et al.* 1996, PASJ, 48, 619. X-ray line emission from SS433.
Safi-Harb & Ögelman 1997, ApJ, 483, 868. ROSAT observations.
Dubner *et al.* 1998, AJ, 116, 1842. VLA at 328 MHz (64″×60″ : $S$ = 160±20 Jy), and 1.4 GHz (56″×54″), plus NRAO 140-ft at 1.4 GHz (21′) for HI observations.
Safi-Harb & Petre 1999, ApJ, 512, 784. X-ray observations.
Aharonian *et al.* 2001, A&A, 375, 1008. Limit on high energy γ-rays.
Brinkmann *et al.* 2007, A&A, 463, 611. XMM observations of E lobe.
Boumis *et al.* 2007, MNRAS, 381, 308. Optical observations.
Lockman *et al.* 2007, MNRAS, 381, 881. HI observations.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 37±4 Jy), including polarisation and review of flux densities.

## G40.5−0.5

**RA:** $19^h07^m10^s$ **1-GHz flux/Jy:** 11 **Size/arcmin:** 22
**Dec:** +06°31′ **Spectral index:** 0.4 **Type:** S

**Radio:** Shell, brightest to the NE.

**References:**


Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Downes *et al.* 1980, A&A, 92, 47. Effelsberg 100-m at 1.7 GHz (7′.6 : $S$ = 9.3±1.3 Jy), and 2.7 GHz (4′.4 : $S$ = 7.2±0.5 Jy), plus review of flux densities.
Aharonian *et al.* 2001, A&A, 375, 1008. Limit on high energy γ-rays.
Yang *et al.* 2006, ChJAA, 6, 210. CO observations of surroundings.
Abdo *et al.* 2007, ApJ, 664, L91. γ-ray observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 6.4±0.3 Jy) including polarisation and review of flux densities.


## G41.1−0.3 3C397

**RA:** $19^h07^m34^s$ **1-GHz flux/Jy:** 25 **Size/arcmin:** 4.5×2.5
**Dec:** +07°08′ **Spectral index:** 0.50 **Type:** S

**Radio:** 3C397 is two sources: the E is the SNR, the W is a HII region.
**X-ray:** Brighter to the E and W, with central component.
**Distance:** Possible limit of $> 7.5$ kpc for non-thermal component from HI absorption.

**References:**


Kundu *et al.* 1974, AJ, 79, 132. NRAO 140-ft at 10 GHz (3′) and 5 GHz (6′).
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 21.3±1.2 Jy for both components).
Caswell *et al.* 1975, A&A, 45, 239. HI absorption.
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430\ \mathrm{MHz}}$ = 82±51 Jy, also Algonquin 46-m at 10.6 GHz (3′ : $S$ = 12±2 Jy), and Haystack 36-m at 15.5 GHz (2′.3 : $S$ = 8.5±3.0 Jy).
Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S$ = 29.8 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 8.7 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Caswell *et al.* 1982, MNRAS, 200, 1143. FIRST at 1.4 GHz (58″×52″).
Becker *et al.* 1985, ApJ, 296, 461. VLA at 1.4 and 5 GHz (8″), plus Einstein observations.
Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (smoothed to 30″ : $S$ = 4.10±0.19 Jy).
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3′.5×3′.6 : $S$ = 46.3 Jy).
Anderson & Rudnick 1993, ApJ, 408, 514. VLA at 1.45 and 4.89 GHz, for spectral index studies.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Chen *et al.* 1999, ApJ, 520, 737. ASCA and ROSAT observations.
Dyer & Reynolds 1999, ApJ, 526, 365. VLA at 1.5 GHz (6″.9×6″.6) and 4.8 GHz (46″.4×5″.6), including polarisation and comparison with ROSAT image.
Safi-Harb *et al.* 2000, ApJ, 545, 922. ROSAT, ASCA and other X-ray observations.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Aharonian *et al.* 2001, A&A, 375, 1008. Limit on high energy γ-rays.
Safi-Harb *et al.* 2005, ApJ, 618, 321. Chandra observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Jiang *et al.* 2010, ApJ, 712, 1147. CO observations of region.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 18.5±1.1 Jy) including polarisation and review of flux densities.
Yang *et al.* 2013, ApJ, 766, 44. Suzaku spectroscopy.


## G41.5+0.4

**RA:** $19^h05^m50^s$ **1-GHz flux/Jy:** 1? **Size/arcmin:** 10
**Dec:** +07°46′ **Spectral index:** ? **Type:** S?

**Radio:** Partial clumpy shell, brighter to NE.

**References:**


Kaplan *et al.* 2002, ApJ, 566, 378. VLA at 332 MHz (20″ : $S$ = 1.8±0.4 Jy).
Alves *et al.* 2012, MNRAS, 422, 2429. Radio observations.

## G42.0−0.1

**RA:** $19^h08^m10^s$ **1-GHz flux/Jy:** 0.5? **Size/arcmin:** 8
**Dec:** +08°00′ **Spectral index:** ? **Type:** S?

**Radio:** Irregular shell.

**References:**

Kaplan *et al.* 2002, ApJ, 566, 378. VLA at 332 MHz (20″ : $S$ = 1.8±0.4 Jy).
Alves *et al.* 2012, MNRAS, 422, 2429. Radio observations.

## G42.8+0.6

**RA:** $19^h07^m20^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 24
**Dec:** +09°05′ **Spectral index:** 0.5? **Type:** S

Has been called G42.8+0.65.

**Radio:** Faint shell.

**Point sources:** Near soft gamma repeater, and young pulsar.

**References:**

Fürst *et al.* 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′.4 : $S$ = 1.5±0.2 Jy), plus other flux densities.
Vasisht *et al.* 1994, ApJ, 431, L35. VLA at 327 MHz (3′.2×3′.4).
Hurley *et al.* 1996, ApJ, 463, L13. Observations of soft gamma repeater field.
Lorimer & Xilouris 2000, ApJ, 545, 385. Pulsar detection.
Aharonian *et al.* 2001, A&A, 375, 1008. Limit on high energy γ-rays.
Kaplan *et al.* 2002, ApJ, 566, 378. VLA at 333 MHz (50″), and other observations of the region.

## G43.3−0.2 W49B

**RA:** $19^h11^m08^s$ **1-GHz flux/Jy:** 38 **Size/arcmin:** 4×3
**Dec:** +09°06′ **Spectral index:** 0.46 **Type:** S

**Radio:** Shell, brightest to the SE and W, near the HII region W49A.

**X-ray:** Centrally brightened, elongated E–W.

**Point sources:** Compact X-ray source.

**Distance:** HI absorption indicates 10 kpc.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 2.7 GHz (4′).
Downes & Wilson 1974, A&A, 34, 133. Effelsberg 100-m at 10.7 GHz (1′.3).
Green *et al.* 1975, A&A, 44, 187. Effelsberg 100-m at 15.0 GHz (58″ : $S$ = 9.0±0.7 Jy).
Lockhart & Goss 1978, A&A, 67, 355. HI absorption.
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Pye *et al.* 1984, MNRAS, 207, 649. Einstein observations, and VLA at 1.4 and 5 GHz (both 12″).
Smith *et al.* 1985, ApJ, 296, 469. EXOSAT spectrum.
Morsi & Reich 1987, A&AS, 71, 189. Effelsberg 100-m at 32 GHz (smoothed to 30″ : $S$ = 6.90±0.38 Jy).
Moffett & Reynolds 1994, ApJ, 437, 705. VLA at 330 MHz (6″.7×7″.7 : $S$ = 64.4 Jy), 1.48 GHz (4″.8×5″.2 : $S$ = 31.8 Jy) and 4.85 GHz (4″.0×4″.1), including polarisation.
Fujimoto *et al.* 1995, PASJ, 47, L31. ASCA observations.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Hwang *et al.* 2000, ApJ, 532, 970. ROSAT image and ASCA spectroscopy.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Aharonian *et al.* 2001, A&A, 375, 1008. Limit on high energy γ-rays.
Brogan & Troland 2001, ApJ, 550, 799. VLA at 1.4 GHz (27″×24″ and 5″) for HI Zeeman splitting.
Lacey *et al.* 2001, ApJ, 559, 954. VLA at 74 MHz (26″×23″ : $S$ = 55.6 Jy) and 326 MHz (6″.6×6″.2 : $S$ = 56.0 Jy).
Kaplan *et al.* 2002, ApJ, 566, 378. VLA at 333 MHz (50″), and other observations of the region.
Kawasaki *et al.* 2005, ApJ, 631, 935. ASCA observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Miceli *et al.* 2006, A&A, 453, 567. XMM observations.
Keohane *et al.* 2007, ApJ, 654, 938. IR and Chandra observations.
Ozawa *et al.* 2009, ApJ, 706, L71. Suzaku observations.
Abdo *et al.* 2010, ApJ, 722, 1303. Fermi observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 19.1±1.0 Jy) including polarisation and review of flux densities.
Rodes-Roca 2013, A&A, 555, A115. IR of compact X-ray source.
Yang *et al.* 2013, ApJ, 766, 44. Suzaku spectroscopy.
Lopez *et al.* 2013, ApJ, 777, 145. Chandra spectroscopy.

## G43.9+1.6

**RA:** $19^h05^m50^s$ **1-GHz flux/Jy:** 9.0 **Size/arcmin:** 60?
**Dec:** +10°30′ **Spectral index:** 0.5 **Type:** S?

**Radio:** Large, poorly defined faint shell.
**Point sources:** Soft gamma repeater nearby.

**References:**
Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Vasisht *et al.* 1994, ApJ, 431, L35. VLA at 327 MHz (3′.2×3′.4).
Hurley *et al.* 1996, ApJ, 463, L13. Observations of soft gamma repeater field.
Kaplan *et al.* 2002, ApJ, 566, 378. VLA at 333 MHz (50″), and other observations of the region.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 4.55\pm0.24$ Jy) including polarisation and review of flux densities.

## G45.7−0.4

**RA:** $19^h16^m25^s$ **1-GHz flux/Jy:** 4.2? **Size/arcmin:** 22
**Dec:** +11°09′ **Spectral index:** 0.4? **Type:** S

**Radio:** Shell, brightest to the SE, poorly defined to NW.

**References:**
Fürst *et al.* 1987, A&AS, 69, 403. Effelsberg 100-m at 4.75 GHz (2′.4 : $S = 2.6\pm0.3$ Jy), plus other flux densities.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

## G46.8−0.3 (HC30)

**RA:** $19^h18^m10^s$ **1-GHz flux/Jy:** 17 **Size/arcmin:** 17×13
**Dec:** +12°09′ **Spectral index:** 0.54 **Type:** S

Has been called G46.6–0.2.

**Radio:** Shell, two bright arcs to NNW and SSE.
**Distance:** HI absorption suggests 6.8–8.8 kpc.

**References:**
Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : $S = 9.8\pm0.9$ Jy), and 37-m at 1.7 GHz ($S = 14.5\pm5.5$ Jy).
Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S = 20.3$ Jy) and Parkes 64-m at 5 GHz (4′ : $S = 7.1$ Jy).
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430\ \mathrm{MHz}} = 46\pm21$ Jy.
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6′.8 : $S = 5.9\pm0.6$ Jy).
Sato 1979, ApL, 20, 43. HI observations.
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 1.4 GHz (58″×53″ : $S = 13.3\pm0.1$ Jy).
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 7.02\pm0.18$ Jy) including polarisation and review of flux densities.

## G49.2−0.7 (W51)

**RA:** $19^h23^m50^s$ **1-GHz flux/Jy:** 160? **Size/arcmin:** 30
**Dec:** +14°06′ **Spectral index:** 0.3? **Type:** S?

**Radio:** In complex region, parameters uncertain.
**Optical:** Some diffuse emission possibly associated.
**X-ray:** Elongated east–west.
**Distance:** Association with CO gives 6 kpc. HI suggest 4.3 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Parkes 64-m at 5 GHz (4′).
Sato 1973, PASJ, 25, 135. HI absorption.
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′), $S = 51.5\pm3.2$ Jy, for the non-thermal component, but probably confused.
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Seward 1990, ApJS, 73, 781. Einstein observations.
Copetti & Schmidt 1991, MNRAS, 250, 127. 151 MHz observations.
Kassim 1992, AJ, 103, 943. VLA at 327 MHz (3.′1×3.′5).
Subrahmanyan & Goss 1995, MNRAS, 275, 755. VLA at 330 MHz (1.′1).
Koo *et al.* 1995, ApJ, 447, 211. ROSAT observations.
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Green *et al.* 1997, AJ, 114, 2058. OH masers.
Koo & Moon 1997, ApJ, 475, 194. Arecibo (3′) and VLA (40″×42″) at 1.4 GHz for HI.
Koo & Moon 1997, ApJ, 485, 263. NRAO 12-m CO and $HCO^+$ observations.
Brogan *et al.* 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
Mavromatakis *et al.* 2001, A&A, 370, 265. Optical observations.
Koo *et al.* 2002, AJ, 123, 1629. ASCA observations.
Koo *et al.* 2005, ApJ, 633, 946. Chandra observations.
Kang & Koo 2007, ApJS, 173, 85. SGPS of high velocity HI.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Abdo *et al.* 2009, ApJ, 706, L1. Fermi observations.
Koo *et al.* 2010, AJ, 140, 262. HI Zeeman splitting observations.
Ceccarelli *et al.* 2011, ApJ, 740, L4. Molecular line observations of region.
Aleksić *et al.* 2012, A&A, 541, A13. γ-ray observations.
Hanabata *et al.* 2013, PASJ, 65, 42. Suzaku observations.
Tian & Leahy 2013, ApJ, 769, L17. HI observations of region.
Brogan *et al.* 2013, ApJ, 771, 91. VLA at 74 MHz (84″×92″) and 320 MHz (33″×35″), plus OH, molecular line and other observations.
Park *et al.* 2013, ApJ, 777, 14. Arecibo of HI in region.


## G53.6−2.2 3C400.2, NRAO 611

**RA:** $19^h38^m50^s$ **1-GHz flux/Jy:** 8 **Size/arcmin:** 33×28
**Dec:** +17°14′ **Spectral index:** 0.50 **Type:** S

Has been called G53.7–2.2.

**Radio:** Ring of emission, with extension to NW.
**Optical:** Filaments and diffuse emission.
**X-ray:** Centrally brightened, offset to NW.
**Distance:** Association with HI gives 2.8 kpc.

**References:**


Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : $S = 5.3\pm0.6$ Jy).
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S = 4.8\pm0.3$ Jy).
Clark *et al.* 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : $S = 11.7$ Jy).
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430\ \mathrm{MHz}} = 20\pm10$ Jy, $S_{318\ \mathrm{MHz}} = 20\pm3.6$ Jy.
Goss *et al.* 1975, A&A, 43, 459. WSRT at 610 MHz (1′×3′ : $S = 13.2\pm1.6$ Jy).
Sabbadin & d'Odorico 1976, A&A, 49, 119. Optical spectra.
van den Bergh 1978, ApJS, 38, 119. Optical observations.
Rosado 1983, RMxAA, 8, 59. Optical spectra.
Blair & Long 1988, PASP, 100, 461. Optical imaging and spectroscopy.
*see also:* Blair & Long 1988, PASP, 100, 651. Erratum.
Long *et al.* 1991, ApJ, 373, 567. Einstein and optical observations.
Winkler *et al.* 1993, ApJ, 405, 608. Optical imaging.
Dubner *et al.* 1994, AJ, 108, 207. VLA at 327 MHz (59″) and 1.49 GHz (52″), plus X-rays.
Saken *et al.* 1995, ApJ, 443, 231. ROSAT observations.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Giacani *et al.* 1998, A&AS, 133, 61. DRAO at 1.4 GHz for HI studies, including distance.
Yoshita *et al.* 2001, PASJ, 53, 93. ASCA observations, and spectral comparison with ROSAT.
Ambrocio-Cruz *et al.* 2006, RMxAA, 42, 241. Optical imaging and spectroscopy.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S = 4.00\pm0.22$ Jy) including polarisation and review of flux densities.

## G54.1+0.3

**RA:** $19^h30^m31^s$ **1-GHz flux/Jy:** 0.5 **Size/arcmin:** 12?
**Dec:** +18°52′ **Spectral index:** 0.1 **Type:** C?

**Radio:** Filled-centre core, with faint diffuse emission.
**X-ray:** Centrally concentrated, with more extended diffuse emission.
**Point sources:** Central pulsar.
**Distance:** HI absorption suggests 4.5–9 kpc, association with CO suggest 8.2 kpc.

**References:**


Green 1985, MNRAS, 216, 691. Radio at 2.7 GHz (7″×20″).
Reich *et al.* 1985, A&A, 151, L10. Effelsberg 100-m at 4.75 GHz (2′.4 : $S$ = 0.37±0.04 Jy)
Velusamy & Becker 1988, AJ, 95, 1162. VLA at 1.4 (14″ : $S$ = 0.48±0.03 Jy), 1.6 (14″ : $S$ = 0.42±0.03 Jy) and 5 GHz (5″ : $S$ = 0.33±0.02 Jy), Ooty at 327 MHz ($S$ = 0.50±0.08 Jy), plus review of flux densities.
Seward 1989, AJ, 97, 481. Einstein observations.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Lu *et al.* 2001, A&A, 370, 570. ROSAT and ASCA observations.
Lu *et al.* 2002, ApJ, 568, L49. Chandra observations.
Camilo *et al.* 2002, ApJ, 574, L71. Pulsar detection.
Kaplan & Moon 2006, ApJ, 644, 1056. IR upper limit for pulsar.
Leahy *et al.* 2008, AJ, 136, 1477. VGPS at 1.4 GHz (1′) including HI.
Koo *et al.* 2008, ApJ, 673, L147. AKARI observations of surroundings.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Bocchino *et al.* 2010, A&A, 520, A71. XMM and Suzaku observations.
Lang *et al.* 2010, ApJ, 709, 1125. VLA at 1.4 GHz (6″.6×6″.8), 4.7 GHz (3″.2×3″.3), and 8.2 GHz (3″.0×3″.2) and Spitzer observations.
Acciari *et al.* 2010, ApJ, 719, L69. γ-ray observations.
Lee *et al.* 2012, JKAS, 45, 117. CO observations of region.


## G54.4−0.3 (HC40)

**RA:** $19^h33^m20^s$ **1-GHz flux/Jy:** 28 **Size/arcmin:** 40
**Dec:** +18°56′ **Spectral index:** 0.5 **Type:** S

Has been called G54.5–0.3.

**Radio:** Shell, in complex region.
**Optical:** Faint filaments.

**References:**


Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 34.4±5.0 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6).
Caswell 1985, AJ, 90, 1224. DRAO at 1.4 GHz (1′.3×2′.6 : $S$ = 18±4 Jy).
Velusamy *et al.* 1986, JApA, 7, 105. WSRT at 609 MHz (50″×191″ smoothed to 100″×200″).
Junkes *et al.* 1992, A&AS, 96, 1. Surrounding CO.
Junkes *et al.* 1992, A&A, 261, 289. Nearby IRAS sources.
Boumis *et al.* 2005, A&A, 443, 175. Optical observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Kang & Koo 2007, ApJS, 173, 85. SGPS of high velocity HI.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.
Park *et al.* 2013, ApJ, 777, 14. Arecibo of HI in region.


## G55.0+0.3

**RA:** $19^h32^m00^s$ **1-GHz flux/Jy:** 0.5? **Size/arcmin:** 20×15?
**Dec:** +19°50′ **Spectral index:** 0.5? **Type:** S

Has been called G55.2+0.5.

**Radio:** Faint, partial shell.
**Point sources:** Old pulsar nearby.
**Distance:** Association with HI features implies 14 kpc.

**References:**


Matthews *et al.* 1998, ApJ, 493, 312. WSRT at 327 MHz (1′.0×2′.9 : $S$ = 0.98±0.15 Jy), DRAO at 1.4 GHz (1′.0×2′.9 : $S$ = 0.25±0.12 Jy), plus HI observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

## G55.7+3.4

**RA:** $19^h21^m20^s$ **1-GHz flux/Jy:** 1? **Size/arcmin:** 23
**Dec:** $+21°44'$ **Spectral index:** 0.3? **Type:** S

**Radio:** Incomplete shell.
**Point sources:** Old pulsar within the boundary of the remnant.

**References:**
Goss *et al.* 1977, A&A, 61, 93. WSRT observations at 610 MHz ($57''\times156''$ : $S = 1.9\pm0.2$ Jy) and 1415 MHz ($27''\times72''$ : $S = 1.0\pm0.1$ Jy).
Bhatnagar *et al.* 2011, ApJ, 739, L20. VLA at 1.3 to 1.9 GHz ($30''$).
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5$ : $S = 0.52\pm0.03$ Jy) including polarisation and review of flux densities.

## G57.2+0.8 (4C21.53)

**RA:** $19^h34^m59^s$ **1-GHz flux/Jy:** 1.8 **Size/arcmin:** 12?
**Dec:** $+21°57'$ **Spectral index:** 0.62 **Type:** S?

**Radio:** Extended non-thermal arc.
**Point sources:** Near the millisecond pulsar, but not thought to be related.

**References:**
Sieber & Seiradakis 1984, A&A, 130, 257. Effelsberg 100-m at 1.4 GHz ($8'.8$ : $1.34\pm0.1$), 2.7 GHz ($4'.3$ : $0.86\pm0.1$), plus other surveys of the area.
Caswell *et al.* 1985, AJ, 90, 488. DRAO at 1.4 GHz ($1'\times3'$).
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5$ : $S = 0.74\pm0.04$ Jy) including polarisation and review of flux densities.

## G59.5+0.1

**RA:** $19^h42^m33^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 15
**Dec:** $+23°35'$ **Spectral index:** ? **Type:** S

Has been called G59.6+0.1.

**Radio:** Incomplete shell.
**Optical:** Diffuse shell.

**References:**
Taylor *et al.* 1992, AJ, 103, 931. WSRT at 327 MHz ($1'.0\times2'.5$ : $S = 5.1\pm0.2$ Jy), and northern sky survey at 4.9 GHz.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Gök *et al.* 2008, Ap&SS, 318, 207. Optical observations.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Xu & Wang 2012, A&A, 543, A24. CO observations of SE.

## G59.8+1.2

**RA:** $19^h38^m55^s$ **1-GHz flux/Jy:** 1.5 **Size/arcmin:** $20\times16$?
**Dec:** $+24°19'$ **Spectral index:** 0.0 **Type:** ?

Has been called G59.7+1.2.

**Radio:** Poorly defined source.
**Optical:** Faint diffuse emission and filaments.

**References:**
Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Junkes *et al.* 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz ($4'.3$), including polarisation.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz ($4'.3$).
Boumis *et al.* 2005, A&A, 443, 175. Optical observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5$ : $S = 1.43\pm0.08$ Jy) including polarisation and review of flux densities.

## G63.7+1.1

**RA:** $19^h47^m52^s$ **1-GHz flux/Jy:** 1.8 **Size/arcmin:** 8
**Dec:** +27°45′ **Spectral index:** 0.24 **Type:** F

**Radio:** Centrally brightened, with core.

**References:**

Wallace *et al.* 1997, AJ, 114, 2068. WSRT at 1.4 GHz (14″×26″ : $S$ = 1.63 Jy), DRAO at 1.4 GHz (smoothed to 2′), plus review of flux densities and other observations.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 1.12±0.06 Jy) including polarisation and review of flux densities.

## G64.5+0.9

**RA:** $19^h50^m25^s$ **1-GHz flux/Jy:** 0.15? **Size/arcmin:** 8
**Dec:** +28°16′ **Spectral index:** 0.5 **Type:** S?

**Radio:** Shell with central source.

**References:**

Hurley-Walker *et al.* 2009, MNRAS, 398, 249. Radio identification.

## G65.1+0.6

**RA:** $19^h54^m40^s$ **1-GHz flux/Jy:** 5.5 **Size/arcmin:** 90×50
**Dec:** +28°35′ **Spectral index:** 0.61 **Type:** S

**Radio:** Large, faint shell.
**Point sources:** Old pulsar nearby.
**Distance:** Possible association with HI suggests 9 kpc.

**References:**

Landecker *et al.* 1990, A&A, 232, 207. DRAO at 408 MHz (3.′5×7.′0 : $S$ = 9.5±0.1 Jy), and 1.4 GHz (1.′0×2.′0 : $S$ = 5.4±1.0 Jy).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Tian & Leahy 2006, A&A, 455, 1053. CGPS at 408 MHz (2.′8×5.′9 : $S$ = 8.6±0.8 Jy) and 1.4 GHz (0.′8×1.′7 : $S$ = 4.9±0.5 Jy) including HI.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 9.1±1.0 Jy) and 1420 MHz (∼ 1′ : $S$ = 3.9±0.5 Jy), including review of flux densities.
Aleksić *et al.* 2010, ApJ, 725, 1629. Fermi observations.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 3.2±0.3 Jy), including polarisation and review of flux densities.

## G65.3+5.7

**RA:** $19^h33^m00^s$ **1-GHz flux/Jy:** 42 **Size/arcmin:** 310×240
**Dec:** +31°10′ **Spectral index:** 0.6 **Type:** S?

Has been called G65.2+5.7.

**Radio:** Large, faint ring, near S91 and S94.
**Optical:** Filamentary ring.
**X-ray:** Diffuse, centrally brightened.
**Distance:** Optical proper motions and velocities indicates 0.8 kpc.

**References:**

Gull *et al.* 1977, ApJ, 215, L69. Optical plates.
Reich *et al.* 1979, A&A, 72, 270. Effelsberg 100-m observations at 1.42 GHz (smoothed to 11′ : $S$ = 42.4±1.6 Jy), estimate $S_{408\ \mathrm{MHz}}$ = 91±5 Jy from previous sky survey.
Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
Rosado 1981, ApJ, 250, 222. Optical interferometry.
Fesen *et al.* 1983, ApJS, 51, 337. Deep [OIII] imagery.
Fesen *et al.* 1985, ApJ, 292, 29. Optical spectra.
Seward 1990, ApJS, 73, 781. Einstein observations.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Mavromatakis *et al.* 2002, A&A, 388, 355. Optical observations.
Boumis *et al.* 2004, A&A, 424, 583. Optical observations.
Shelton *et al.* 2004, ApJ, 615, 275. ROSAT observations.
Kaplan *et al.* 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
Xiao *et al.* 2009, A&A, 503, 827. Effelsberg 100-m at 2.7 GHz (4.′4 : $S$ = 22±3 Jy), and Urumqi 21-m at 4.8 GHz (9.′5 : $S$ = 16.8±1.8 Jy) including polarisation and review of flux densities.
Gosachinskii 2010, AstL, 36, 260. HI observations.
Kim *et al.* 2010, ApJ, 722, 388. Far UV observations.

## G65.7+1.2 DA 495

**RA:** $19^h52^m10^s$ **1-GHz flux/Jy:** 5.1 **Size/arcmin:** 22
**Dec:** $+29°26'$ **Spectral index:** varies **Type:** F

Has mistakenly been called G55.7+1.2.

**Radio:** Centrally brightened with thick shell?
**X-ray:** Detected.
**Point sources:** Compact X-ray source near centre.
**Distance:** HI polarisation observations suggest 1.5 kpc.

**References:**


Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz ($5' : S = 2.8\pm0.4$ Jy), and 37-m at 1.7 GHz ($S = 4.4\pm0.5$ Jy), plus review of flux densities.
*see also:* Willis 1973, A&A, 27, 483. Erratum.
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430\ MHz} = 8.7\pm4.9$ Jy, $S_{318\ MHz} = 9.7\pm2.2$ Jy.
Landecker & Caswell 1983, AJ, 88, 1810. DRAO at 1.4 GHz ($0'.9\times1'.5 : S = 4.4\pm0.2$ Jy).
Velusamy *et al.* 1989, JApA, 10, 161. Ooty at 327 MHz ($36''\times64''$), WSRT at 610 MHz ($62''$) and VLA at 1.4 GHz ($36''$ and $12''$), including IRAS imaging.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Kothes *et al.* 2004, ApJ, 607, 855. HI polarisation absorption.
Arzoumanian *et al.* 2004, ApJ, 610, L101. ROSAT and ASCA observations of compact source.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 6.5\pm0.6$ Jy) and 1420 MHz ($\sim 1' : S = 4.0\pm0.2$ Jy), including polarisation and review of flux densities.
Arzoumanian *et al.* 2008, ApJ, 687, 505. Chandra observations.
Kothes *et al.* 2008, ApJ, 687, 516. CGPS at 408 MHz ($2'.9\times6'.0 : S = 6.5\pm0.5$ Jy) and 1.4 GHz ($0'.82\times1'.75 : S = 4.0\pm0.2$ Jy), Effelsberg 100-m at 4.85 GHz ($2'.45 : S = 1.6\pm0.1$ Jy) and 10.55 GHz (smoothed to $2'.45 : S = 1.1\pm0.1$ Jy), plus review of flux densities.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5 : S = 1.95\pm0.10$ Jy) including polarisation and review of flux densities.


## G65.8−0.5

**RA:** $19^h59^m20^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 10×6?
**Dec:** $+28°38'$ **Spectral index:** ? **Type:** S

**Radio:** Arc in W.
**Optical:** Diffuse shell, brighter in W.

**References:**


Sabin *et al.* 2013, MNRAS, 431, 279. Hα and radio survey observations.


## G66.0−0.0

**RA:** $19^h57^m50^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 31×25?
**Dec:** $+29°03'$ **Spectral index:** ? **Type:** S

**Radio:** Some emission in N.
**Optical:** Incomplete shell.

**References:**


Sabin *et al.* 2013, MNRAS, 431, 279. Hα and radio survey observations.


## G67.6+0.9

**RA:** $19^h57^m45^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 50×45?
**Dec:** $+30°53'$ **Spectral index:** ? **Type:** S

**Radio:** Arc in S.
**Optical:** Filamentary shell.

**References:**


Sabin *et al.* 2013, MNRAS, 431, 279. Hα and radio survey observations.

## G67.7+1.8

**RA:** $19^h54^m32^s$ **1-GHz flux/Jy:** 1.0 **Size/arcmin:** 15×12
**Dec:** +31°29′ **Spectral index:** 0.61 **Type:** S

**Radio:** Double arc shell.
**Optical:** Filaments in N.
**X-ray:** Detected.
**Point sources:** Compact X-ray source.

**References:**


Taylor *et al.* 1992, AJ, 103, 931. WSRT at 327 MHz (1′.9×1′.0 : $S$ = 1.9±0.1 Jy), and northern sky survey at 4.9 GHz ($S$ = 0.42±0.05 Jy).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Mavromatakis *et al.* 2001, A&A, 370, 265. Optical observations.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 1.1±0.1 Jy) and 1420 MHz (∼ 1′ : $S$ = 0.68±0.04 Jy), including polarisation and review of flux densities.
Gök *et al.* 2008, Ap&SS, 318, 207. Optical observations.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Hui & Becker 2009, A&A, 494, 1005. Chandra observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 0.30±0.03 Jy) including polarisation and review of flux densities.


## G67.8+0.5

**RA:** $20^h00^m00^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 7×5
**Dec:** +30°51′ **Spectral index:** ? **Type:** ?

**Radio:** Poorly resolved arc.
**Optical:** Diffuse shell, brighter to W.

**References:**


Sabin *et al.* 2013, MNRAS, 431, 279. Hα and radio survey observations.


## G68.6−1.2

**RA:** $20^h08^m40^s$ **1-GHz flux/Jy:** 1.1 **Size/arcmin:** 23
**Dec:** +30°37′ **Spectral index:** 0.2 **Type:** ?

**Radio:** Faint, poorly defined source.

**References:**


Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Junkes *et al.* 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz (4′.3), including polarisation.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 1420 MHz (∼ 1′ : $S$ = 0.57±0.08 Jy), including review of flux densities
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 0.80±0.04 Jy) including polarisation and review of flux densities.

## G69.0+2.7 CTB 80

**RA:** $19^h53^m20^s$ **1-GHz flux/Jy:** 120? **Size/arcmin:** 80?
**Dec:** $+32°55'$ **Spectral index:** varies **Type:** ?

An association with a SN in AD1408 has been suggested. Has been called G68.8+2.8. Is it a SNR?

**Radio:** Compact core, flat spectrum plateau, and steeper spectrum extensions, with spectral break?
**Optical:** Expanding nebulosity near centre, with filaments to the SW and far NE.
**X-ray:** Diffuse emission with compact source.
**Point sources:** Pulsar at western edge of core.
**Distance:** HI observations suggest 1.5 kpc.

**References:**


Angerhofer *et al.* 1981, A&A, 94, 313. WSRT at 610 MHz ($56''\times103''$) 1.4 GHz ($24''\times44''$) and 5 GHz ($7''\times13''$), plus optical.
Becker *et al.* 1982, ApJ, 255, 557. X-ray observations.
Sofue *et al.* 1983, PASJ, 35, 437. NRO 45-m at 10.2 GHz ($2'.7$).
Velusamy & Kundu 1983, JApA, 4, 253. VLA of compact sources.
Blair *et al.* 1984, ApJ, 282, 161. Optical images and spectra.
Wang & Seward 1984, ApJ, 285, 607. Einstein observations.
Strom *et al.* 1984, A&A, 139, 43. Radio observations of flat spectrum component, VLA 5 GHz ($1''.7$) and 1.4 GHz.
Mantovani *et al.* 1985, A&A, 145, 50. Bologna at 408 MHz ($2'.6\times4'.9 : S = 67.5\pm10.5$ Jy), Effelsberg 100-m at 1.41 ($9' : S = 62\pm9$ Jy), 1.72 ($7'.6 : S = 66\pm5$ Jy), 2.7 ($4'.5 : S = 52\pm4$ Jy) and 4.75 GHz ($2'.4 : S = 44\pm3.3$ Jy), plus review of flux densities.
Kulkarni *et al.* 1988, Nature, 331, 50. Pulsar detection.
Angelini *et al.* 1988, ApJ, 330, L43. EXOSAT spectra.
Fesen *et al.* 1988, Nature, 334, 229. IRAS of surrounding shell.
Junkes *et al.* 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz ($4'.3$), including polarisation.
Whitehead *et al.* 1989, MNRAS, 237, 1109. Optical of core.
Salter *et al.* 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz of core, plus review of flux densities.
Hester & Kulkarni 1989, ApJ, 340, 362. Optical imaging and spectroscopy.
Koo *et al.* 1990, ApJ, 364, 178. Large, expanding HI shell.
Greidanus & Strom 1990, A&A, 240, 376. Optical kinematics of core.
Koo *et al.* 1993, ApJ, 417, 196. VLA at 1.4 GHz of surrounding HI ($1'$), plus IRAS.
Safi-Harb *et al.* 1995, ApJ, 439, 722. ROSAT observations.
Srinivasan 1997, ApJ, 489, 170. γ-ray observations of pulsar.
Mavromatakis *et al.* 2001, A&A, 371, 300. Optical observations.
Butler *et al.* 2002, A&A, 395, 845. HST detection of pulsar.
Migliazzo *et al.* 2002, ApJ, 567, L141. Pulsar proper motion study.
Castelletti *et al.* 2003, AJ, 126, 2114. GMRT at 240 and 618 MHz ($26''\times17''$ and $10''\times6''$) and VLA at 324 and 1380 MHz ($73''\times63''$ and $93''\times78''$).
Moon *et al.* 2004, ApJ, 610, L33. Chandra and HST observations of core.
Li *et al.* 2005, ApJ, 628, 931. Chandra observations of pulsar and surroundings.
Golden *et al.* 2005, ApJ, 635, L153. High resolution radio observations of pulsar and surroundings.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 72\pm7$ Jy) and 1420 MHz ($\sim 1' : S = 56\pm5$ Jy), including polarisation and review of flux densities.
Kang & Koo 2007, ApJS, 173, 85. SGPS of high velocity HI.
Albert *et al.* 2007, ApJ, 669, 1143. γ-ray observations.
Zeiger *et al.* 2008, ApJ, 674, 271. Proper motion of pulsar.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz ($9'.5 : S = 36\pm4$ Jy), including polarisation and review of flux densities.
Leahy & Ranasinghe 2012, MNRAS, 423, 718. CGPS at 1.4 GHz, including HI, plus ROSAT observations.
Park *et al.* 2013, ApJ, 777, 14. Arecibo of HI in region.


## G69.7+1.0

**RA:** $20^h02^m40^s$ **1-GHz flux/Jy:** 2.0 **Size/arcmin:** 16×14
**Dec:** $+32°43'$ **Spectral index:** 0.7 **Type:** S

**Radio:** Poorly resolved source.
**X-ray:** Detected.

**References:**


Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Junkes *et al.* 1988, LNP, 316, 134. Effelsberg 100-m at 2.7 GHz ($4'.3$), including polarisation.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz ($4'.3$).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Yoshita *et al.* 2000, PASJ, 52, 867. ROSAT and ASCA observations.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 3.2\pm0.4$ Jy) and 1420 MHz ($\sim 1' : S = 1.5\pm0.1$ Jy), including review of flux densities.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5 : S = 0.78\pm0.07$ Jy) including polarisation and review of flux densities.

## G73.9+0.9

**RA:** $20^h14^m15^s$ **1-GHz flux/Jy:** 9 **Size/arcmin:** 27
**Dec:** $+36°12'$ **Spectral index:** 0.23 **Type:** S?

**Radio:** Diffuse, centrally brightened to SW.
**Optical:** Faint shell.

**References:**


Reich *et al.* 1986, A&A, 155, 185. Effelsberg 100-m at 4.75 GHz ($2'.4 : S = 6.7 \pm 0.5$ Jy), plus other flux densities.
Chastenay & Pineault 1988, IAUCo, 101, 297. DRAO at 408 MHz ($3'.5 \times 5'.9$) and 1.4 GHz ($1'.0 \times 1'.7$).
Pineault & Chastenay 1990, MNRAS, 246, 169. DRAO at 408 MHz ($3'.4 \times 5'.8 : S = 12.7 \pm 1.2$ Jy) and 1.4 GHz ($1'.0 \times 1'.7 : S = 7.4 \pm 1.0$ Jy).
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Pineault *et al.* 1996, AJ, 112, 201. DRAO at 1.4 GHz (smoothed to $2'$) for HI.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Mavromatakis 2003, A&A, 398, 153. Optical observations.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 10.0 \pm 1.7$ Jy) and 1420 MHz ($\sim 1' : S = 7.6 \pm 0.6$ Jy), including polarisation and review of flux densities.
Sitnik 2010, ARep, 54, 317. Hα and CO observations of region.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5 : S = 6.2 \pm 0.3$ Jy) including polarisation and review of flux densities.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

## G74.0−8.5 Cygnus Loop

**RA:** $20^h51^m00^s$ **1-GHz flux/Jy:** 210 **Size/arcmin:** 230×160
**Dec:** +30°40′ **Spectral index:** varies **Type:** S

Has been suggested that this is two overlapping remnants.

**Radio:** Shell, brightest to the NE, with fainter breakout region to S, with spectral variations.

**Optical:** Large filamentary loop, brightest to the NE, not well defined to the S or W.

**X-ray:** Shell in soft X-rays.

**Point sources:** Several compact radio sources within the boundary of the remnant, including CL4, plus X-ray sources in S.

**Distance:** Optical proper motion and shock velocity gives 0.44 kpc.

**References:**


Green 1990, AJ, 100, 1927. DRAO at 408 MHz (3′.3×6′.7) for spectral index study, plus X-ray and optical.
Graham *et al.* 1991, AJ, 101, 175. Shocked molecular H outside rim in NE.
Shull & Clarke 1991, PASP, 103, 811. Optical spectroscopy of nearside filaments.
Fesen *et al.* 1992, AJ, 104, 719. Hα imagery.
Long *et al.* 1992, ApJ, 400, 214. Optical of Balmer dominated filament.
Arendt *et al.* 1992, ApJ, 400, 562. IRAS observations.
Hester *et al.* 1994, ApJ, 420, 721. Hα, [OIII] and other optical observations of Balmer dominated filaments in NE.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Levenson *et al.* 1997, ApJ, 484, 304. ROSAT observations.
Leahy *et al.* 1997, AJ, 114, 2081. DRAO at 1.4 GHz (1′×2′), including polarisation.
Leahy & Roger 1998, ApJ, 505, 784. DRAO at 1.4 GHz (1′.0×1′.9) and 408 MHz (3′.4×6′.9), for spectral index studies in comparison with other radio observations.
Levenson *et al.* 1998, ApJS, 118, 541. Optical images.
Roger *et al.* 1999, A&AS, 137, 7. 22 MHz flux density ($S$ = 1400±400 Jy).
Bohigas *et al.* 1999, ApJ, 518, 324. Optical spectroscopy of surroundings.
Levenson *et al.* 1999, ApJ, 526, 874. ROSAT images.
Blair *et al.* 1999, AJ, 118, 942. HST observations, for distance.
Aschenbach & Leahy 1999, A&A, 341, 602. ROSAT image, and comparison with radio.
Danforth *et al.* 2000, AJ, 119, 2319. UV, optical and X-ray comparison of selected regions.
Miyata *et al.* 2001, ApJ, 550, 1023. ASCA observations of compact X-ray sources.
Miyata & Tsunemi 2001, ApJ, 552, 624. ASCA spectroscopy of regions in N and E.
Ghavamian *et al.* 2001, ApJ, 547, 995. Optical spectroscopy.
Danforth *et al.* 2001, AJ, 122, 938. Far-UV spectroscopy, Hα and other optical observations of NE region.
Levenson & Graham 2001, ApJ, 559, 948. HST of SE region.
Uyanıker *et al.* 2002, A&A, 389, L61. Effelsberg 100-m at 2.7 GHz (4′.3) including polarisation, and comparison with ROSAT data.
Leahy 2002, AJ, 123, 2689. DRAO at 1.4 GHz (4′×2′) for HI.
Blair *et al.* 2002, ApJS, 140, 367. UV spectroscopy.
Welsh *et al.* 2002, A&A, 391, 705. Optical absorption to background stars.
Sankrit & Blair 2002, ApJ, 565, 297. UV observations of NE filament.
Levenson *et al.* 2002, ApJ, 576, 798. Chandra observations of W edge.
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′.5: $S$ = 184±18 Jy).
Leahy 2004, MNRAS, 351, 385. Chandra observations of SW.
Uyanıker *et al.* 2004, A&A, 426, 909. Effelsberg 100-m at 2.7 GHz (4′.3), with comparison with other data for spectral index studies.
Blair *et al.* 2005, AJ, 129, 2268. HST of outer filaments.
Leahy 2005, AJ, 130, 165. DRAO at 1.4 GHz of SE.
Levenson & Graham 2005, ApJ, 622, 366. Chandra observations of knot in SE.
Sun *et al.* 2006, A&A, 447, 937. Urumqi 25-m at 4.8 GHz (9′.5: $S$ = 90±9 Jy), with comparisons with other data for spectral index studies.
Kaplan *et al.* 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
Seon *et al.* 2006, ApJ, 644, L175. Far UV observations.
Sankrit *et al.* 2007, AJ, 133, 1383. UV observations of part.
Tsunemi *et al.* 2007, ApJ, 671, 1717. XMM observations of NE to SW.
Miyata *et al.* 2007, PASJ, 59, S163. Suzaku observations of NE.
Nemes *et al.* 2008, ApJ, 675, 1293. XMM observations of NE.
Katsuda *et al.* 2008, ApJ, 680, 1198. Chandra observations of NE.
Uchida *et al.* 2008, ApJ, 688, 1102. XMM observations.
Uchida *et al.* 2009, PASJ, 61, 503. Suzaku observations of N.
Kimura *et al.* 2009, PASJ, 61, S137. Suzaku observations from NE to SW.
Tsunemi *et al.* 2009, PASJ, 61, S147. Suzaku observations of SE.
Kosugi *et al.* 2010, PASJ, 62, 1035. Suzaku observations of SE.
Sankrit *et al.* 2010, ApJ, 712, 1092. Spitzer observations.
McEntaffer & Brantseg 2011, ApJ, 730, 99. Chandra observations of E.
Katagiri *et al.* 2011, ApJ, 741, 44. Fermi observations.
Katsuda *et al.* 2012, ApJ, 754, L7. Suzaku and XMM observations.
Leahy & Hassan 2013, ApJ, 764, 55. Suzaku and XMM observations of SW.
Oakley *et al.* 2013, ApJ, 766, 51. X-ray spectroscopy.

## G74.9+1.2 CTB 87

**RA:** $20^h16^m02^s$ **1-GHz flux/Jy:** 9 **Size/arcmin:** 8×6
**Dec:** +37°12′ **Spectral index:** varies **Type:** F

**Radio:** Filled-centre, with high polarisation and high frequency turnover.
**X-ray:** Centrally brightened.
**Point sources:** Compact X-ray source in SE.
**Distance:** HI absorption indicates 12 kpc, optical extinction gives 6.1 kpc.

**References:**


Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo $S_{430\ MHz}$ = 12.2±9.7 Jy, $S_{318\ MHz}$ = 17.7±5.0 Jy.
Weiler & Shaver 1978, A&A, 70, 389. WSRT at 610 MHz (57″×94″ : $S$ = 9.1±1.2 Jy), 1.4 (24″×40″ : $S$ = 8.7±1.2 Jy) and 5 GHz (24″×40″ : $S$ = 5.6±1.3 Jy).
Geldzahler *et al.* 1980, A&A, 84, 237. Effelsberg 100-m at 2.7 GHz (4′.4 : $S$ = 7.6±0.5 Jy).
Wilson 1980, ApJ, 241, L19. Einstein observations.
van Gorkom *et al.* 1982, MNRAS, 198, 757. WSRT HI absorption of nearby compact source.
Seaquist & Gilmore 1982, AJ, 87, 378. VLA observations of nearby source.
Morsi & Reich 1987, A&AS, 69, 533. Effelsberg 100-m at 32 GHz (smoothed to 40″ : $S$ = 1.47±0.19 Jy).
Green & Gull 1989, MNRAS, 237, 555. VLA at 1.4 GHz (1′.2×1′.4) including HI.
Salter *et al.* 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz, plus review of flux densities.
Pineault & Chastenay 1990, MNRAS, 246, 169. DRAO at 408 MHz (3′.4×5′.8 : $S$ = 11.6±0.4 Jy) and 1.4 GHz (1′.0×1′.7 : $S$ = 7.2±0.3 Jy).
Asaoka & Koyama 1990, PASJ, 42, 625. Ginga X-ray spectrum.
Wendker *et al.* 1991, A&A, 241, 551. DRAO at 408 MHz (3′.5×5′.2 : $S$ = 13.3±0.8 Jy) and Effelsberg 100-m at 4.8 GHz ($S$ = 7.5±0.7 Jy).
Wallace *et al.* 1994, A&A, 286, 565. HI of surroundings.
Cho *et al.* 1994, AJ, 108, 634. CO of adjacent molecular clouds.
Gorham *et al.* 1996, ApJ, 458, 257. Pulsar search.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Wallace *et al.* 1997, A&A, 317, 212. DRAO at 408 MHz (3′.4×5′.5) and 1.4 GHz (1′.0×1′.6) including HI (smoothed to 2′).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Kothes *et al.* 2003, ApJ, 588, 852. CGPS at 1.4 GHz (1′.6×1′) including HI, plus CO observations.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 11.9±0.9 Jy) and 1420 MHz (∼ 1′ : $S$ = 7.1±1.1 Jy), including polarisation and review of flux densities.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Sitnik 2010, ARep, 54, 317. Hα and CO observations of region.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 6.4±0.4 Jy) including polarisation and review of flux densities.
Matheson *et al.* 2013, ApJ, 774, 33. Chandra observations.


## G76.9+1.0

**RA:** $20^h22^m20^s$ **1-GHz flux/Jy:** 2? **Size/arcmin:** 9
**Dec:** +38°43′ **Spectral index:** ? **Type:** C

**Radio:** Bipolar shell.
**Point sources:** Central pulsar.

**References:**


Landecker *et al.* 1993, A&A, 276, 522. VLA at 1.49 GHz (14″), 4.86 GHz (13″×16″) and 8.55 GHz (11″×12″), including polarisation and review of flux densities.
Landecker *et al.* 1997, A&AS, 123, 199. Miyun at 232-MHz (3′.8×5′.4).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 2.3±0.2 Jy) and 1420 MHz (∼ 1′ : $S$ = 1.35±0.07 Jy), including polarisation and review of flux densities.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 0.79±0.07 Jy) including polarisation and review of flux densities.
Marthi *et al.* 2011, MNRAS, 416, 2560. GMRT at 618 MHz (51″×54″), 1160 MHz (2″.2×3″.4), and Chandra observations of central source.
Arzoumanian *et al.* 2011, ApJ, 739, 39. Pulsar detection.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

## G78.2+2.1 DR4, γ Cygni SNR

**RA:** $20^h20^m50^s$ **1-GHz flux/Jy:** 320 **Size/arcmin:** 60
**Dec:** +40°26′ **Spectral index:** 0.51 **Type:** S

Has been called G78.1+1.8.

**Radio:** In complex region (early catalogues refer to other proposed remnants in this region).

**Optical:** Faint filaments, spectra indicate a SNR superposed on a HII region.

**X-ray:** Weak emission from the SE of the remnant.

**Point sources:** X-ray pulsar at edge of remnant.

**Distance:** Associations with other objects suggests 1.7 to 2.6 kpc.

**References:**


Higgs *et al.* 1977, AJ, 82, 718. DRAO at 1.4 GHz (2′×3′ : $S$ = 270±40 Jy) plus some 10 GHz (4′) survey data, reveals true extent of remnant.
d'Odorico & Sabbadin 1977, A&AS, 28, 439. Optical spectra.
van den Bergh 1978, ApJS, 38, 119. Optical observations.
Landecker *et al.* 1980, A&AS, 39, 133. DRAO HI observations (2′×3.′1).
Higgs *et al.* 1983, AJ, 88, 97. CO of surroundings.
Bohigas *et al.* 1983, RMxAA, 8, 155. Optical spectra, find thermal only.
Braun & Strom 1986, A&AS, 63, 345. WSRT HI observations.
Fukui & Tatematsu 1988, IAUCo, 101, 261. CO observations of the vicinity (2.′7).
Green 1989, MNRAS, 238, 737. OH observations.
Pineault & Chastenay 1990, MNRAS, 246, 169. DRAO at 408 MHz (3.′4×5.′8 : $S$ = 480±60 Jy) and 1.4 GHz (1.′0×1.′7 : $S$ = 270±40 Jy).
Wendker *et al.* 1991, A&A, 241, 551. DRAO at 408 MHz (3.′5×5.′2 : $S$ = 540±40 Jy) and Effelsberg 100-m at 4.8 GHz ($S$ = 150±15 Jy).
Esposito *et al.* 1996, ApJ, 461, 820. Associated γ-ray emission.
Brazier *et al.* 1996, MNRAS, 281, 1033. γ-ray and X-ray point source.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Zhang *et al.* 1997, A&A, 324, 641. Multi-frequency radio comparison.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Roberts *et al.* 2001, ApJS, 133, 451. ASCA observations.
Uchiyama *et al.* 2002, ApJ, 571, 866. ASCA observations.
Mavromatakis 2003, A&A, 408, 237. Optical observations.
Bykov 2004, A&A, 427, L21. Hard X-ray observations.
Becker *et al.* 2004, ApJ, 615, 897. Chandra and other observations of compact sources.
Weisskopf *et al.* 2006, ApJ, 652, 387. Chandra and other observations of compact sources.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 500±35 Jy) and 1420 MHz (∼ 1′ : $S$ = 226±19 Jy), including review of flux densities.
Kang & Koo 2007, ApJS, 173, 85. SGPS of high velocity HI.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Ladouceur & Pineault 2008, A&A, 490, 197. CGPS at 408 MHz (2.′9×4.′5) and 1.4 GHz (0.′8×1.′5).
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 170±18 Jy), including polarisation and review of flux densities.
Leahy *et al.* 2013, MNRAS, 436, 968. ROSAT and Chandra observations, and CGPS for HI.
Aliu *et al.* 2013, ApJ, 770, 93. γ-ray observations.
Lin *et al.* 2013, ApJ, 770, L9. Pulsar detection.


## G82.2+5.3 W63

**RA:** $20^h19^m00^s$ **1-GHz flux/Jy:** 120? **Size/arcmin:** 95×65
**Dec:** +45°30′ **Spectral index:** 0.5? **Type:** S

Has been called G82.5+5.3.

**Radio:** Shell in the Cygnus X complex.

**Optical:** In complex region, but spectra indicate SNR filaments.

**X-ray:** Detected.

**References:**


Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 59.0±3.5 Jy).
Sabbadin 1976, A&A, 51, 159. Optical spectra.
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz (6.′8). Incomplete mapping.
Rosado & González 1981, RMxAA, 5, 93. Optical spectra.
Seward 1990, ApJS, 73, 781. Einstein observations.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14.′5 : $S$ = 82.5±5.5 Jy).
Uyanıker *et al.* 2003, ApJ, 585, 785. CGPS at 1.4 GHz (1′) including polarisation, of part.
Mavromatakis *et al.* 2004, A&A, 415, 1051. ROSAT, ASCA and optical observations.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 144±12 Jy) and 1420 MHz (∼ 1′ : $S$ = 93±5 Jy), including review of flux densities.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 49±5 Jy), including polarisation and review of flux densities.

## G83.0−0.3

**RA:** $20^h46^m55^s$ **1-GHz flux/Jy:** 1 **Size/arcmin:** 9×7
**Dec:** +42°52′ **Spectral index:** 0.4 **Type:** S

**Radio:** Incomplete shell.

**References:**

Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S = 1.2\pm0.3$ Jy) and 1420 MHz (∼ 1′ : $S = 0.8\pm0.1$ Jy, including polarisation and review of flux densities.

## G84.2−0.8

**RA:** $20^h53^m20^s$ **1-GHz flux/Jy:** 11 **Size/arcmin:** 20×16
**Dec:** +43°27′ **Spectral index:** 0.5 **Type:** S

**Radio:** Elongated shell, with a filament aligned with the major axis.
**X-ray:** Detected.
**Distance:** HI absorption suggests 6 kpc.

**References:**

Matthews *et al.* 1977, A&A, 55, 1. WSRT at 610 MHz (56″×81″ : $S = 12.4\pm1.5$ Jy) and Effelsberg 100-m at 2.7 GHz (4′.4 : $S = 6.8\pm1.3$ Jy).
Matthews & Shaver 1980, A&A, 87, 255. WSRT at 1415 MHz (23″×32″), and Effelsberg 100-m at 2.7 GHz (4′.4 : $S = 5.6\pm0.5$ Jy).
Feldt & Green 1993, A&A, 274, 421. DRAO at 1.4 GHz (1′×1′.5), including HI, plus CO observations.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Uyanıker *et al.* 2003, ApJ, 585, 785. CGPS at 1.4 GHz (1′) including polarisation.
Kaplan *et al.* 2004, ApJS, 153, 269. Chandra limits for any compact source.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S = 14.5\pm0.5$ Jy) and 1420 MHz (∼ 1′ : $S = 7.2\pm0.8$ Jy), including review of flux densities.
Leahy & Green 2012, ApJ, 760, 25. CGPS, including HI, plus Chandra observations.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

## G85.4+0.7

**RA:** $20^h50^m40^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 24?
**Dec:** +45°22′ **Spectral index:** 0.2 **Type:** S

**Radio:** Faint, incomplete shell, within larger thermal shell.
**X-ray:** Centrally brightened.
**Distance:** HI observations suggest 3.5 kpc.

**References:**

Kothes *et al.* 2001, A&A, 376, 641. CGPS at 408 MHz (4′.4×2′.8 : $S < 0.45$ Jy) and 1.4 GHz (1′.1×0′.8), plus HI, X-ray and optical data.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S = 2.9\pm0.5$ Jy) and 1420 MHz (∼ 1′ : $S = 2.3\pm0.2$ Jy), including review of flux densities.
Jackson *et al.* 2008, ApJ, 674, 936. XMM and HI observations.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

## G85.9−0.6

**RA:** $20^h58^m40^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 24
**Dec:** +44°53′ **Spectral index:** 0.2 **Type:** S

**Radio:** Faint, incomplete shell.
**Optical:** Diffuse shell.
**X-ray:** Centrally brightened.
**Distance:** HI observations suggest 4.8 kpc.

**References:**

Kothes *et al.* 2001, A&A, 376, 641. CGPS at 408 MHz (4′.4×2′.8 : $S < 0.9$ Jy) and 1.4 GHz (1′.1×0′.8), plus HI, X-ray and optical data.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S = 3.0\pm1.3$ Jy) and 1420 MHz (∼ 1′ : $S = 2.2\pm0.8$ Jy), including review of flux densities.
Jackson *et al.* 2008, ApJ, 674, 936. XMM and HI observations.
Gök *et al.* 2009, Ap&SS, 324, 17. Optical observations.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

## G89.0+4.7 HB21

**RA:** $20^h45^m00^s$ **1-GHz flux/Jy:** 220 **Size/arcmin:** 120×90
**Dec:** +50°35′ **Spectral index:** 0.38 **Type:** S

**Radio:** Distorted shell (4C50.52, an extragalactic double, is within the boundary of the remnant).
**Optical:** Filaments and patches.
**X-ray:** Centrally brightened.
**Distance:** Various associations imply 0.8 kpc.

**References:**


Hirabayashi & Takahashi 1972, PASJ, 24, 231. 30-m dish at 4.2 GHz (11′ : $S$ = 160±40 Jy).
Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 148±16 Jy), plus optical filaments.
Hill 1974, MNRAS, 169, 59. Half-Mile Telescope at 1.4 GHz (3′×3.′9).
Haslam *et al.* 1975, A&A, 39, 453. Effelsberg 100-m at 2.7 GHz (4.′4)
Fukui & Tatematsu 1988, IAUCo, 101, 261. CO observations of the vicinity (2.′7).
Tatematsu *et al.* 1990, A&A, 237, 189. DRAO at 408 MHz (3.′5×4.′5) and 1.4 GHz (1.′0×1.′3), including HI, plus CO observations of adjacent molecular cloud.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Leahy & Aschenbach 1996, A&A, 315, 260. ROSAT observations.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Koo *et al.* 2001, ApJ, 552, 175. NRAO 12-m and other CO observations (27″ and 45″) of eastern part.
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14.′5 : $S$ = 228±5 Jy).
Uyanıker *et al.* 2003, ApJ, 585, 785. CGPS at 1.4 GHz (1′) including polarisation.
Byun *et al.* 2006, ApJ, 637, 283. CO observations of surroundings.
Lazendic & Slane 2006, ApJ, 647, 350. X-ray observations.
Leahy 2006, ApJ, 647, 1125. CGPS at 408 MHz (2.′8×3.′7) and 1.4 GHz (0.′8×1.′1).
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼3′ : $S$ = 259±19 Jy) and 1420 MHz (∼1′ : $S$ = 183±9 Jy), including polarisation and review of flux densities.
Kang & Koo 2007, ApJS, 173, 85. SGPS of high velocity HI.
Mavromatakis *et al.* 2007, A&A, 461, 991. Optical observations.
Shinn *et al.* 2009, ApJ, 693, 1883. IR observations.
Pannuti *et al.* 2010, AJ, 140, 1787. ASCA and Chandra observations.
Shinn *et al.* 2010, AdSpR, 45, 445. IR observations in S.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 107±11 Jy), including polarisation and review of flux densities.
Reichardt *et al.* 2012, A&A, 546, A21. γ-ray detection.
Shinn *et al.* 2012, ApJ, 759, 34. AKARI observations of $H_2$.
Pivato *et al.* 2013, ApJ, 779, 179. Fermi observations.


## G93.3+6.9 DA 530, 4C(T)55.38.1

**RA:** $20^h52^m25^s$ **1-GHz flux/Jy:** 9 **Size/arcmin:** 27×20
**Dec:** +55°21′ **Spectral index:** 0.45 **Type:** C?

Has been called G93.2+6.7.

**Radio:** Shell, with two bright limbs, highly polarised.
**X-ray:** Compact central source.
**Distance:** HI observations suggest 2.2 kpc.

**References:**


Roger & Costain 1976, A&A, 51, 151. DRAO at 1.42 GHz (2′×2.′4 : $S$ = 6.9 Jy).
Haslam *et al.* 1980, A&A, 92, 57. Effelsberg 100-m at 1.72 GHz (7.′6 : $S$ = 6.47±0.52 Jy) and 2.7 GHz (4.′4 : $S$ = 5.64±0.64 Jy), plus review of flux densities.
Lalitha *et al.* 1984, A&A, 131, 196. Effelsberg 100-m at 4.75 GHz (smoothed to 3′ : $S$ = 4.01±0.57 Jy).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Landecker *et al.* 1999, ApJ, 527, 866. DRAO at 408 MHz (3.′5×4.′3) and 1.4 GHz (1.′0×1.′2), including polarisation and HI.
Foster & Routledge 2003, ApJ, 598, 1005. HI for distance.
Kaplan *et al.* 2004, ApJS, 153, 269. Chandra limits for any compact source.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼3′ : $S$ = 10.5±0.7 Jy) and 1420 MHz, including review of flux densities.
Jiang *et al.* 2007, ApJ, 670, 1142. Chandra observations.
Bocchino *et al.* 2008, AdSpR, 41, 407. XMM observations.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

## G93.7−0.2 CTB 104A, DA 551

**RA:** $21^h29^m20^s$ **1-GHz flux/Jy:** 65 **Size/arcmin:** 80
**Dec:** +50°50′ **Spectral index:** 0.65 **Type:** S

Has been called G93.6–0.2 and G93.7–0.3.

**Radio:** Distorted, faint shell.

**Distance:** Association with HI features suggests 1.5 kpc.

**References:**


Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 18.4±1.0 Jy).
Mantovani *et al.* 1982, A&A, 105, 176. Effelsberg 100-m at 1.7 GHz (7.′6 : $S$ = 53.5±5.0 Jy), plus review of flux densities.
Landecker *et al.* 1985, AJ, 90, 1082. DRAO at 1.4 GHz (smoothed to 2′ : $S$ = 58±6 Jy).
Mantovani *et al.* 1991, A&A, 247, 545. Effelsberg 100-m at 4.75 GHz (smoothed to 3′ : $S$ = 33.5±4.0 Jy), including polarisation, plus review of flux densities.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.
Uyanıker *et al.* 2002, ApJ, 565, 1022. CGPS 1.4 GHz (54″×49″), including HI, and 408 MHz (3.′7×2.′8).
Uyanıker *et al.* 2003, ApJ, 585, 785. CGPS at 1.4 GHz (1′) including polarisation.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 67±6 Jy) and 1420 MHz (∼ 1′ : $S$ = 35±4 Jy), including polarisation and review of flux densities.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 25.0±2.5 Jy), including polarisation and review of flux densities.


## G94.0+1.0 3C434.1

**RA:** $21^h24^m50^s$ **1-GHz flux/Jy:** 13 **Size/arcmin:** 30×25
**Dec:** +51°53′ **Spectral index:** 0.45 **Type:** S

**Radio:** Incomplete shell, containing HI shell.

**Distance:** Association with stellar wind bubble implies 5.2 kpc.

**References:**


Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 6.1±0.8 Jy), and 37-m at 1.7 GHz ($S$ = 11±3 Jy).
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 5.8±0.4 Jy). Also NRAO 140-ft at 5 GHz (6′).
Mantovani *et al.* 1982, A&A, 105, 176. Effelsberg 100-m at 1.7 GHz (7.′6 : $S$ = 12.0±1.3 Jy), plus review of flux densities.
Goss *et al.* 1984, A&A, 138, 469. WSRT at 610 MHz (smoothed to 100″ : $S$ = 16±1.7 Jy) and Effelsberg 100-m at 4.75 GHz (2.′4 : $S$ = 7.2±0.5 Jy).
Landecker *et al.* 1985, AJ, 90, 1082. DRAO at 1.4 GHz (smoothed to 2′ : $S$ = 16±3 Jy).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Uyanıker *et al.* 2003, ApJ, 585, 785. CGPS at 1.4 GHz (1′) including polarisation.
Foster *et al.* 2004, A&A, 417, 79. DRAO at 1.4 GHz, including HI.
Foster 2005, A&A, 441, 1043. CGPS at 408 MHz (2.′8×3.′6) and 1.4 GHz (0.′8×1.′0) for spectral index studies, plus other observations.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 20±2 Jy) and 1420 MHz (∼ 1′ : $S$ = 11.3±1.0 Jy), including review of flux densities.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 6.2±0.4 Jy) including polarisation and review of flux densities.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.
Jeong *et al.* 2013, ApJ, 770, 105. CO observations of region.


## G96.0+2.0

**RA:** $21^h30^m30^s$ **1-GHz flux/Jy:** 0.35 **Size/arcmin:** 26
**Dec:** +53°59′ **Spectral index:** 0.6 **Type:** S

**Radio:** Faint, arc in S, poorly defined in N.

**Distance:** Association for HI indicates 4 kpc.

**References:**


Kothes *et al.* 2005, A&A, 444, 871. CGPS at 408 MHz (2.′8×3.′5) and 1.4 GHz (50″×61″) including HI.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 0.42±0.06 Jy) and 1420 MHz (∼ 1′ : $S$ = 0.24±0.02 Jy), including review of flux densities.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 0.14±0.02 Jy) including polarisation and review of flux densities.

## G106.3+2.7

**RA:** $22^h27^m30^s$ **1-GHz flux/Jy:** 6 **Size/arcmin:** 60×24
**Dec:** +60°50′ **Spectral index:** 0.6 **Type:** C?

Incorporates the pulsar wind nebula G106.6+2.9 (the 'Boomerang').

**Radio:** Faint extended source, which brighter 'head' to NE.

**X-ray:** Pulsar and wind nebula.

**Point sources:** Pulsar.

**References:**


Pineault & Joncas 2000, AJ, 120, 3218. DRAO at 408 MHz (3′.9×3′.5 : $S$ = 10.5±0.3 Jy) and 1.4 GHz (1′.2×1′.0 : $S$ = 4.9±0.6 Jy), plus HI.

Halpern *et al.* 2001, ApJ, 547, 323. X-ray and radio observations of the 'head'.

Halpern *et al.* 2001, ApJ, 552, L125. Pulsar detection.

Kothes *et al.* 2001, ApJ, 560, 236. CGPS at 1.4 GHz, including HI, plus CO and other observations.

Kothes *et al.* 2004, ApJ, 607, 855. HI polarisation absorption.

Ng & Romani 2004, ApJ, 601, 479. Chandra detection of pulsar wind nebula.

Kothes *et al.* 2006, ApJ, 638, 225. Effelsberg 100-m at 4.85 (2′.4), 8.35 (1′.4), 10.5 (1′.2) and 32 GHz (0′.45) of pulsar wind nebula, including polarisation.

Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 8.6±1.0 Jy) and 1420 MHz (∼ 1′ : $S$ = 4.8±0.5 Jy), including polarisation and review of flux densities.

Abdo *et al.* 2007, ApJ, 664, L91. γ-ray observations.

Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.

Acciari *et al.* 2009, ApJ, 703, L6. γ-ray observations.

Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 2.0±0.3 Jy), including polarisation and review of flux densities.


## G108.2−0.6

**RA:** $22^h53^m40^s$ **1-GHz flux/Jy:** 8 **Size/arcmin:** 70×54
**Dec:** +58°50′ **Spectral index:** 0.5 **Type:** S

**Radio:** Faint shell.

**Distance:** Possible associated HI structures suggest 3.2 kpc.

**References:**


Tian *et al.* 2007, A&A, 465, 907. DRAO at 408 MHz (2′.8×3′.3 : $S$ = 11.5±1.2 Jy) and 1.4 GHz (1′.0×1′.2 : $S$ = 6.6±0.7 Jy) including HI.

## G109.1−1.0 CTB 109

**RA:** $23^h01^m35^s$ **1-GHz flux/Jy:** 22 **Size/arcmin:** 28
**Dec:** +58°53′ **Spectral index:** 0.45 **Type:** S

**Radio:** Semicircular shell, with the Molecular cloud S152 is to the immediate W.
**X-ray:** Semicircular shell, with pulsar at W edge.
**Point sources:** Long period X-ray pulsar.
**Distance:** Various observations imply 3.2 kpc.

**References:**


Hughes *et al.* 1981, ApJ, 246, L127. WSRT at 610 MHz (1′ : $S$ = 40±5 Jy) shows bad CLEAN artefacts.
Blair & Kirshner 1981, Nature, 291, 132. Optical spectra.
Downes 1983, MNRAS, 203, 695. Effelsberg 100-m at 2.7 GHz (4.′4 : $S$ = 13.0±1.5 Jy).
Sofue *et al.* 1983, PASJ, 35, 447. NRO 45-m at 10.2 GHz (2.′7).
Hughes *et al.* 1984, ApJ, 283, 147. WSRT at 610 MHz (20″ : $S$ = 26±3 Jy) 1.4 GHz (10″), DRAO at 1.4 GHz (1′×1.′2 : $S$ = 16.8±2 Jy) and Algonquin 46-m at 6.5 GHz (4.′5 : $S$ = 6.7±1 Jy).
Braun & Strom 1986, A&AS, 63, 345. WSRT HI observations.
Tatematsu *et al.* 1987, PASJ, 39, 755. NRO 45-m at 10 GHz (2.′7), plus polarisation.
Tatematsu *et al.* 1987, A&A, 184, 279. CO observations of the surroundings (2.′7).
Hanson *et al.* 1988, A&A, 195, 114. EXOSAT of pulsar.
*see also:* Hanson *et al.* 1988, A&A, 207, 204. Erratum.
Morini *et al.* 1988, ApJ, 333, 777. EXOSAT observations.
Koyama *et al.* 1989, PASJ, 41, 461. X-ray observations of pulsar.
Coe *et al.* 1989, MNRAS, 238, 649. IRAS observations of surroundings.
Green 1989, MNRAS, 238, 737. OH observations.
Tatematsu *et al.* 1990, ApJ, 351, 157. CO of surroundings, plus X-ray observations.
Davies & Coe 1991, MNRAS, 249, 313. Optical and IR observations near pulsar.
Hurford & Fesen 1995, MNRAS, 277, 549. ROSAT imaging.
Rho & Petre 1997, ApJ, 484, 828. ROSAT observations.
Parmar *et al.* 1998, A&A, 330, 175. X-ray observations.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.
Patel *et al.* 2001, ApJ, 563, L45. Chandra observations of pulsar.
Kothes *et al.* 2002, ApJ, 576, 169. CGPS at 1.4 GHz (68″×59″), including HI, plus CO observations.
Sasaki *et al.* 2004, ApJ, 617, 322. XMM observations.
Sasaki *et al.* 2006, ApJ, 642, L149. CO observations of surroundings, plus Chandra observations.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼3′ : $S$ = 26±3 Jy) and 1420 MHz (∼1′ : $S$ = 17.4±1.2 Jy), including polarisation and review of flux densities.
Tian *et al.* 2010, MNRAS, 404, L1. CGPS for HI absorption.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 9.8±0.5 Jy) including polarisation and review of flux densities.
Castro *et al.* 2012, ApJ, 756, 88. Fermi observations.
Kothes & Foster 2012, ApJ, 746, L4. HI and CO observations of region.
Sasaki *et al.* 2013, A&A, 552, A45. Chandra observations of NE.
Tendulakar *et al.* 2013, ApJ, 772, 31. Pulsar proper motion study.

## G111.7−2.1 Cassiopeia A, 3C461

**RA:** $23^h23^m26^s$ **1-GHz flux/Jy:** 2720 **Size/arcmin:** 5
**Dec:** $+58°48'$ **Spectral index:** 0.77 **Type:** S

Presumably the remnant of a late 17th century SN.

**Radio:** Bright shell with compact knots and extended plateau of emission.

**Optical:** Fast knots and quasi-stationary flocculli, with many filaments at large radii, and NE 'jet'.

**X-ray:** Incomplete shell, with hard spectral component.

**Point sources:** Central compact X-ray source.

**Distance:** Optical expansion, plus proper motions indicate 3.4 kpc.


**References:**

Anderson *et al.* 1991, ApJ, 373, 146. VLA at 1.4 and 5 GHz (1.″3) for spectral variations.
Anderson *et al.* 1995, ApJ, 441, 300. VLA at 1.4 GHz and 4.8 GHz (both 1.″3), for polarisation studies.
Anderson & Rudnick 1995, ApJ, 441, 307. VLA at 1.4 GHz and 4.8 GHz, for proper motion studies.
Kassim *et al.* 1995, ApJ, 455, L59. VLA at 74 (25″) and 332 MHz (6″), including spectral index comparisons.
Anderson & Rudnick 1996, ApJ, 456, 234. VLA for spectral index comparisons.
Schwarz *et al.* 1997, A&AS, 123, 43. WSRT at 1.4 GHz (30″) for HI absorption.
Reynoso *et al.* 1997, A&A, 317, 203. VLA at 1.4 GHz (11″×14″) for HI absorption.
O'Sullivan & Green 1999, MNRAS, 303, 575. Flux density changes at 13.5, 15.5 and 16.5 GHz.
Agüeros & Green 1999, MNRAS, 305, 957. 151 MHz observations for bulk expansion studies.
Mason *et al.* 1999, AJ, 118, 2908. Flux density at 32 GHz ($S$ = 194±5 Jy).
Reichart & Stephens 2000, ApJ, 537, 904. Flux density changes at 1405 MHz.
Gotthelf *et al.* 2001, ApJ, 552, L39. Chandra observations, showing outer shock.
Bleeker *et al.* 2001, A&A, 365, L225. XMM observations.
Maccarone *et al.* 2001, A&A, 368, 267. BeppoSAX observations.
Douvion *et al.* 2001, A&A, 369, 589. ISO observations.
Thorstensen *et al.* 2001, AJ, 122, 297. Optical expansion studies.
Hwang *et al.* 2001, ApJ, 560, L175. Chandra observations of Doppler shifted lines.
Fesen *et al.* 2001, AJ, 122, 2644. HST observations.
Willingale *et al.* 2002, A&A, 381, 1039. XMM observations.
Mereghetti *et al.* 2002, ApJ, 569, 275. XMM observations of central source.
Reynoso & Goss 2002, ApJ, 575, 871. VLA at 5 GHz (6.″4×6.″0) for $H_2CO$ absorption studies.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 32 GHz, including polarisation.
Rho *et al.* 2003, ApJ, 592, 299. IR observations.
Laming & Hwang 2003, ApJ, 597, 347. Chandra spectroscopy.
Hines *et al.* 2004, ApJS, 154, 290. Spitzer observations.
Morse *et al.* 2004, ApJ, 614, 727. HST proper motion studies.
Hwang *et al.* 2004, ApJ, 615, L117. Deep Chandra imaging.
Krause *et al.* 2004, Nature, 432, 596. IR and molecular line observations of surroundings.
Bamba *et al.* 2005, ApJ, 621, 793. Chandra observations of rim.
Wilson & Batrla 2005, A&A, 430, 561. Observational constraints on dust.
Krause *et al.* 2005, Science, 308, 1604. Spitzer light echoes from surroundings.
Fesen *et al.* 2006, ApJ, 636, 848. Optical and IR limits for central sources.
Vinyaĭkin 2006, ARep, 50, 143. Secular decrease at 36, 81.5 and 151.5 MHz.
Laming *et al.* 2006, ApJ, 644, 260. Chandra observations, particularly of NE 'jet'.
Fesen *et al.* 2006, ApJ, 645, 283. HST observations for expansion studies.
Renaud *et al.* 2006, ApJ, 647, L41. γ-ray line observations.
Lazendic *et al.* 2006, ApJ, 651, 250. Chandra spectroscopy of bright knots.
Ennis *et al.* 2006, ApJ, 652, 376. Spitzer observations.
Mookerjea *et al.* 2006, MNRAS, 371, 761. Sub-mm [CI] observations.
Kang & Koo 2007, ApJS, 173, 85. SGPS of high velocity HI.
Patnaude & Fesen 2007, AJ, 133, 147. X-ray variability of compact features.
Albert *et al.* 2007, A&A, 474, 937. γ-ray observations.
Rho *et al.* 2008, ApJ, 673, 271. Spitzer observations.
Uchiyama & Aharonian 2008, ApJ, 677, L105. X-ray variability of compact features.
Rest *et al.* 2008, ApJ, 681, L81. SN light echo.
Hammell & Fesen 2008, ApJS, 179, 195. HST of outer knots.
Krause *et al.* 2008, Science, 320, 1195. SN light echo spectrum.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Helmboldt & Kassim 2009, AJ, 138, 838. Low radio frequency temporal variations.
Maeda *et al.* 2009, PASJ, 61, 1217. Suzaku observations.
Smith *et al.* 2009, ApJ, 693, 713. Spitzer observations.
Patnaude & Fesen 2009, ApJ, 697, 535. X-ray proper motions.
Pavlov & Luna 2009, ApJ, 703, 910. Chandra observations of central source.
Barlow *et al.* 2010, A&A, 518, L138. Herschel observations.
Abdo *et al.* 2010, ApJ, 710, L92. Fermi observations.
Acciari *et al.* 2010, ApJ, 714, 163. γ-ray observations.
Sibthorpe *et al.* 2010, ApJ, 719, 1553. AKARI and sub-mm observations of region.
DeLaney *et al.* 2010, ApJ, 725, 2038. Spitzer and Chandra observations for 3-D structure.
Patnaude *et al.* 2011, ApJ, 729, L28. Chandra observations of fading.
Rest *et al.* 2011, ApJ, 732, 3. SN light echo observations.
Fesen *et al.* 2011, ApJ, 736, 109. HST variability studies.
Besel & Krause 2012, A&A, 541, L3. IR light echoes.
Hwang & Laming 2012, ApJ, 746, 130. Chandra observations.
Rho *et al.* 2012, ApJ, 747, L6. AKARI CO observations.
Vogt *et al.* 2012, ApJ, 750, 155. Spitzer light echoes.
Isenne *et al.* 2012, ApJ, 757, 126. Spitzer spectroscopy.
Asgekar *et al.* 2013, A&A, 551, L11. LOFAR of carbon recombination lines.
Yang *et al.* 2013, ApJ, 766, 44. Suzaku spectroscopy.
Rutherford *et al.* 2013, ApJ, 769, 64. Chandra spectroscopy.
Milisavljevic & Fesen 2013, ApJ, 772, 134. Optical spectroscopy for 3-D structure.
Koo *et al.* 2013, Science, 342, 1346. IR spectroscopy.
Willström *et al.* 2013, A&A, 558, L2. CO observations.

## G113.0+0.2

**RA:** $23^h36^m35^s$ **1-GHz flux/Jy:** 4 **Size/arcmin:** 40×17?
**Dec:** +61°22′ **Spectral index:** 0.5? **Type:** ?

**Radio:** Elongated, extent not well defined.
**Point sources:** Contains old pulsar.
**Distance:** Association for HI indicates 3.1 kpc.

**References:**


Kothes *et al.* 2005, A&A, 444, 871. CGPS at 408 MHz (2.′8×3.′1) and 1.4 GHz (49″×55″) including HI.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼3′) and 1420 MHz (∼1′).
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 1.9±0.5 Jy) including polarisation and review of flux densities.


## G114.3+0.3

**RA:** $23^h37^m00^s$ **1-GHz flux/Jy:** 5.5 **Size/arcmin:** 90×55
**Dec:** +61°55′ **Spectral index:** 0.5 **Type:** S

**Radio:** Shell, with HII region S165 within the boundary of the remnant.
**Optical:** Faint emission in centre and to S.
**Point sources:** Pulsar near centre of remnant.
**Distance:** Association with HI and other features implies 0.7 kpc.

**References:**


Reich & Braunsfurth 1981, A&A, 99, 17. Effelsberg 100-m at 2.7 GHz (4.′4 : $S$ = 3.6 Jy) and $S_{1.4\ GHz}$ = 4.4 Jy from 1.4 GHz survey data, plus HI from Maryland–Green Bank survey.
Kulkarni *et al.* 1993, Nature, 362, 135. Pulsar association.
Fürst *et al.* 1993, A&A, 276, 470. Pulsar association.
Becker *et al.* 1996, A&A, 306, 464. ROSAT of pulsar.
Fesen *et al.* 1997, AJ, 113, 767. Optical observations.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz.
Mavromatakis *et al.* 2002, A&A, 383, 1011. Optical observations.
Yar-Uyanıker *et al.* 2004, ApJ, 616, 247. CGPS at 1.4 GHz (49″×55″), including HI (1.′0×1.′1).
Tian & Leahy 2006, ChJAA, 6, 543. CGPS at 408 MHz (3.′4×3.′9 : $S$ = 12.0±6.0 Jy) and 1.4 GHz (1.′0×1.′1 : $S$ = 9.8±0.8 Jy).
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 1420 MHz (∼1′ : $S$ = 5.4±0.8 Jy), including review of flux densities.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 6.9±0.7 Jy), including polarisation and review of flux densities.


## G116.5+1.1

**RA:** $23^h53^m40^s$ **1-GHz flux/Jy:** 10 **Size/arcmin:** 80×60
**Dec:** +63°15′ **Spectral index:** 0.5 **Type:** S

**Radio:** Distinct shell, with high polarisation.
**Optical:** Detected.
**Distance:** Association with HI features implies 1.6 kpc.

**References:**


Reich & Braunsfurth 1981, A&A, 99, 17. Effelsberg 100-m at 2.7 GHz (4.′4 : $S$ = 4.7±0.4 Jy) and $S_{1.4\ GHz}$ = 8.0±0.8 Jy from 1.4 GHz survey data, plus HI from Maryland–Green Bank survey.
Fesen *et al.* 1997, AJ, 113, 767. Optical observations.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Yar-Uyanıker *et al.* 2004, ApJ, 616, 247. CGPS at 1.4 GHz (49″×55″), including HI (1.′0×1.′1).
Mavromatakis *et al.* 2005, A&A, 435, 141. Optical observations.
Tian & Leahy 2006, ChJAA, 6, 543. CGPS at 408 MHz (3.′4×3.′8 : $S$ = 15.0±1.5 Jy) and 1.4 GHz (1.′0×1.′1 : $S$ = 10.6±0. Jy).
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼3′ : $S$ = 12.5±1.6 Jy) and 1420 MHz (∼1′ : $S$ = 10.3±0.70 Jy), including polarisation and review of flux densities.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 5.7±0.6 Jy), including polarisation and review of flux densities.

## G116.9+0.2 CTB 1

**RA:** $23^h59^m10^s$ **1-GHz flux/Jy:** 8 **Size/arcmin:** 34
**Dec:** +62°26′ **Spectral index:** 0.57 **Type:** S

Has been called G117.3+0.1 and G116.9+0.1.

**Radio:** Incomplete shell.
**Optical:** Filaments on sky survey.
**X-ray:** Centrally brightened, with NE 'breakout'.
**Point sources:** Pulsar to NE.
**Distance:** Association with HI features implies 1.6 kpc.

**References:**


Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz ($5' : S = 3.9\pm1.0$ Jy), and 37-m at 1.7 GHz ($S = 5.5\pm2.0$ Jy), plus review of flux densities.
van den Bergh *et al.* 1973, ApJS, 26, 19. Optical observations.
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz ($5' : S = 4.2\pm0.2$ Jy).
Angerhofer *et al.* 1977, A&A, 55, 11. NRAO 140-ft at 5 GHz ($6\farcm8 : S = 3.0\pm0.3$ Jy).
Dickel & Willis 1980, A&A, 85, 55. WSRT at 610 MHz ($56'' \times 64''$) and 1.4 GHz ($22'' \times 25''$).
Reich & Braunsfurth 1981, A&A, 99, 17. Effelsberg 100-m at 2.7 GHz ($4\farcm4 : S = 4.8\pm0.4$ Jy) and $S_{1.4\ \mathrm{GHz}} = 7.8\pm0.8$ Jy from 1.4 GHz survey data, plus HI from Maryland–Green Bank survey.
Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
Landecker *et al.* 1982, AJ, 87, 1379. DRAO at 1.42 GHz and HI ($2'\times2\farcm3 : S = 8.3\pm0.5$ Jy), plus review of flux densities.
*see also:* Landecker *et al.* 1983, AJ, 88, 877. Erratum.
Fesen *et al.* 1985, ApJ, 292, 29. Optical spectra.
Hailey & Craig 1994, ApJ, 434, 635. Optical spectroscopy.
Hailey & Craig 1995, ApJ, 455, L151. ROSAT of nearby pulsar.
Fesen *et al.* 1997, AJ, 113, 767. Optical observations.
Craig *et al.* 1997, ApJ, 488, 307. ROSAT observations.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 10.6 GHz ($69''$), including polarisation.
Yar-Uyanıker *et al.* 2004, ApJ, 616, 247. CGPS at 1.4 GHz ($49''\times55''$), including HI ($1\farcm0\times1\farcm1$).
Lazendic & Slane 2006, ApJ, 647, 350. X-ray observations.
Tian & Leahy 2006, ChJAA, 6, 543. CGPS at 408 MHz ($3\farcm4\times3\farcm8 : S = 15.0\pm1.5$ Jy) and 1.4 GHz ($1\farcm0\times1\farcm1 : S = 8.1\pm0.4$ Jy).
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 10.5\pm0.8$ Jy) and 1420 MHz ($\sim 1' : S = 7.0\pm0.8$ Jy), including review of flux densities.
Pannuti *et al.* 2010, AJ, 140, 1787. ASCA and Chandra observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9\farcm5 : S = 3.6\pm0.4$ Jy) including polarisation and review of flux densities.

## G119.5+10.2 CTA 1

**RA:** $00^h06^m40^s$ **1-GHz flux/Jy:** 36 **Size/arcmin:** 90?
**Dec:** $+72°45'$ **Spectral index:** 0.6 **Type:** S

Has been called G119.5+10.3.

**Radio:** Incomplete shell, with 'breakout' to NW.
**Optical:** Faint diffuse nebulosities.
**X-ray:** Centrally brightened.
**Point sources:** Central pulsar.
**Distance:** Associated HI shell indicates 1.4 kpc.

**References:**
Sieber *et al.* 1979, A&A, 74, 361. Effelsberg 100-m at 2.7 GHz ($4'.4 : S = 23.6 \pm 2.8$ Jy).
Sieber *et al.* 1981, A&A, 103, 393. Effelsberg 100-m at 2.7 GHz and 1.7 GHz ($7'.6 : S = 31.6 \pm 2.5$ Jy), and 151 MHz ($4' : S = 62.6 \pm 6$ Jy).
Fesen *et al.* 1981, ApJ, 247, 148. Optical, including spectra.
Fesen *et al.* 1983, ApJS, 51, 337. Deep [OIII] imagery.
Seward 1990, ApJS, 73, 781. Einstein observations.
Simonetti 1992, ApJ, 386, 170. VLA observations of background sources for rotation measure studies.
Pineault *et al.* 1993, AJ, 105, 1060. DRAO at 1.4 GHz ($1' : S = 34 \pm 4$ Jy), plus HI and IRAS.
Seward *et al.* 1995, ApJ, 453, 284. ROSAT observations.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Slane *et al.* 1997, ApJ, 485, 221. ASCA and ROSAT observations.
Pineault *et al.* 1997, A&A, 324, 1152. DRAO at 408 MHz ($3'.5$) and 1.4 GHz ($1'.0$).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Brazier *et al.* 1998, MNRAS, 295, 819. Studies of central, compact γ-ray source.
Mavromatakis *et al.* 2000, A&A, 353, 371. Optical imagery.
Roberts *et al.* 2001, ApJS, 133, 451. ASCA observations.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 1.4 GHz ($9'.4$).
Slane *et al.* 2004, ApJ, 601, 1045. XMM observations of central source.
Halpern *et al.* 2004, ApJ, 612, 398. Chandra observations of central nebula, plus optical and radio limits for compact source.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Abdo *et al.* 2008, Science, 322, 1218. Fermi detection of pulsar.
Lin *et al.* 2010, ApJ, 725, L1. XMM observations of pulsar.
Caraveo *et al.* 2010, ApJ, 725, L6. XMM observations of pulsar.
Sun *et al.* 2011, A&A, 535, A64. Urumqi 25-m at 4.8 GHz ($9'.5 : S = 11.6 \pm 1.2$ Jy) and Effelsberg 100-m at 2.6 GHz ($4'.4 : S = 20.3 \pm 2.0$ Jy) including polarisation.
Lin *et al.* 2012, MNRAS, 426, 2283. Suzaku observations.
Mignani *et al.* 2013, MNRAS, 430, 1354. Optical limits for pulsar.
Aliu *et al.* 2013, ApJ, 764, 38. γ-ray observations.

## G120.1+1.4 Tycho, 3C10, SN1572

**RA:** $00^h25^m18^s$ **1-GHz flux/Jy:** 56 **Size/arcmin:** 8
**Dec:** $+64°09'$ **Spectral index:** 0.58 **Type:** S

This is the remnant of the Tycho's SN of AD1572.

**Radio:** Shell, brightest to the NE.

**Optical:** Faint filaments/knots to the NNW, NE and E.

**X-ray:** Shell, brighter to the NE.

**Point sources:** Faint radio source near centre of the remnant, thought to be extragalactic.

**Distance:** HI observations suggest 2.3–3 kpc, optical proper motion and shock velocity gives 2.4 kpc.

**References:**


Duin & Strom 1975, A&A, 39, 33. WSRT at 610 MHz ($57''\times64''$) and 5 GHz ($7''\times8''$).
Klein *et al.* 1979, A&A, 76, 120. Effelsberg 100-m at 10.7 GHz ($1'.2: S=13.1\pm0.8$ Jy), plus review of flux densities.
Strom *et al.* 1982, MNRAS, 200, 473. WSRT at 1415 MHz ($27''\times31''$) from 1971 and 1979, for expansion.
Dickel *et al.* 1982, ApJ, 257, 145. Comparison of radio, X-ray and optical observations.
Reid *et al.* 1982, ApJ, 261, 485. Einstein observations.
Seward *et al.* 1983, ApJ, 266, 287. Einstein observations.
Tan & Gull 1985, MNRAS, 216, 949. Radio at 2.7 GHz ($4''$) from 1980 and 1983, and One-Mile Telescope at 1.4 GHz ($23''$) from 1965 and 1980, for expansion.
Albinson *et al.* 1986, MNRAS, 219, 427. HI observations.
Green & Gull 1987, MNRAS, 224, 1055. VLA HI absorption observations towards central radio source.
Smith *et al.* 1988, ApJ, 325, 288. EXOSAT spectrum and image (smoothed to $13''$).
Dickel *et al.* 1991, AJ, 101, 2151. VLA at 1.4 and 5 GHz ($1''.5$).
Wood *et al.* 1992, AJ, 103, 1338. VLA at 5 GHz ($1''.5$) polarisation studies.
Fink *et al.* 1994, A&A, 283, 635. X-ray spectra.
Vancura *et al.* 1995, ApJ, 441, 680. X-ray spectra and ROSAT image.
Predehl & Schmitt 1995, A&A, 293, 889. ROSAT of dust scattered halo.
Schwarz *et al.* 1995, A&A, 299, 193. WSRT and Effelsberg 100-m at 1.4 GHz ($50''$), and VLA at 1.4 GHz ($13''$), for neutral hydrogen studies.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Hwang & Gotthelf 1997, ApJ, 475, 665. ASCA observations.
Reynoso *et al.* 1997, ApJ, 491, 816. VLA at 1.4 GHz ($1''.4\times1''.5$) from 1984 and 1994 for expansion studies.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Reynoso *et al.* 1999, AJ, 117, 1827. VLA at 1.4 GHz ($13''$), for HI studies.
Katz-Stone *et al.* 2000, ApJ, 529, 453. VLA at 333 MHz and 1.4 GHz ($9''.5\times7''.7$), for spectral index studies.
Ghavamian *et al.* 2000, ApJ, 535, 266. Optical observations of shock precursors.
Hughes 2000, ApJ, 545, L53. ROSAT X-ray expansion.
Decourchelle *et al.* 2001, A&A, 365, L218. XMM observations.
Ghavamian *et al.* 2001, ApJ, 547, 995. Optical spectroscopy.
Douvion *et al.* 2001, A&A, 373, 281. ISO observations.
Aharonian *et al.* 2001, A&A, 373, 292. Upper limit on high energy $\gamma$-rays.
Hwang *et al.* 2002, ApJ, 581, 1101. Chandra observations.
Lee *et al.* 2004, ApJ, 605, L113. Observations of molecular clouds in vicinity.
Bamba *et al.* 2005, ApJ, 621, 793. Chandra observations of rim.
Warren *et al.* 2005, ApJ, 634, 376. Chandra observations.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim3'$: $S=86\pm5$ Jy) and 1420 MHz ($\sim1'$: $S=40.5\pm1.5$ Jy), including polarisation and review of flux densities.
Lee *et al.* 2007, ApJ, 659, L133. H$\alpha$ observations.
Cassam-Chenaï *et al.* 2007, ApJ, 665, 315. Chandra observations.
Rest *et al.* 2008, ApJ, 681, L81. SN light echo.
Krause *et al.* 2008, Nature, 456, 617. SN light echo spectrum.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Tamagawa *et al.* 2009, PASJ, 61, S167. Suzaku observations.
Furuzawa *et al.* 2009, ApJ, 693, L61. Suzaku observations.
Lee *et al.* 2010, ApJ, 715, L146. H$\alpha$ observations.
Katsuda *et al.* 2010, ApJ, 709, 1387. Chandra proper motions study.
Raymond *et al.* 2010, ApJ, 712, 901. H$\alpha$ spectroscopy.
Hayato *et al.* 2010, ApJ, 725, 894. Suzaku observations of expansion.
Ishihara *et al.* 2010, A&A, 521, L61. AKARI observations.
Tian & Leahy 2011, ApJ, 729, L15. HI and CO observations.
Acciari *et al.* 2011, ApJ, 730, L20. $\gamma$-ray observations.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz ($9'.5$: $S=20.0\pm2.0$ Jy) including polarisation and review of flux densities.
Giordano *et al.* 2012, ApJ, 744, L2. Fermi observations.
Gomez *et al.* 2012, MNRAS, 420, 3557. Herschel IR dust observations.
Yang *et al.* 2013, ApJ, 766, 44. Suzaku spectroscopy.
Williams *et al.* 2013, ApJ, 770, 129. Spitzer observations.

## G126.2+1.6

**RA:** $01^h22^m00^s$ **1-GHz flux/Jy:** 6 **Size/arcmin:** 70
**Dec:** $+64°15'$ **Spectral index:** 0.5 **Type:** S?

**Radio:** Poorly defined shell.
**Optical:** Filaments, mostly in W.

**References:**


Reich *et al.* 1979, A&A, 78, L13. Effelsberg 100-m at 1.4 GHz ($9' : S = 6.8 \pm 0.7$ Jy) and 2.7 GHz ($4'.4 : S = 3.9 \pm 0.4$ Jy).
Blair *et al.* 1980, ApJ, 242, 592. Optical detection and spectra.
Rosado 1982, RMxAA, 5, 127. Optical spectra.
Fesen *et al.* 1983, ApJS, 51, 337. Deep [OIII] imagery.
Fürst *et al.* 1984, A&A, 133, 11. Effelsberg 100-m at 2.7 GHz ($4'.4$) and 4.8 GHz ($2'.6$).
Joncas *et al.* 1989, A&A, 219, 303. DRAO at 408 MHz ($3'.5 \times 3'.9 : S = 12 \pm 2.5$ Jy) and part at 1.4 GHz ($1'.1 \times 1'.0$), plus review of flux densities.
Xilouris *et al.* 1993, A&A, 270, 393. Optical imaging.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz ($14'.5 : S = 6.1 \pm 1.6$ Jy).
Boumis *et al.* 2005, A&A, 443, 175. Optical observations.
Tian & Leahy 2006, A&A, 447, 205. CGPS at 408 MHz ($3'.4 \times 3'.8$ : $S$ = 9.7±3.9 Jy) and 1.4 GHz ($1'.0 \times 1'.1$ : $S$ = 6.7±2.1 Jy), plus other observations for spectral index studies.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 5.7 \pm 0.7$ Jy) and 1420 MHz ($\sim 1' : S = 6.4 \pm 1.1$ Jy), including review of flux densities.
Sun *et al.* 2007, A&A, 463, 993. Urumqi 25-m at 5 GHz ($9'.5 : S = 2.6 \pm 0.6$ Jy), including polarisation.
*see also:* Sun *et al.* 2007, A&A, 469, 1003. Erratum.


## G127.1+0.5 R5

**RA:** $01^h28^m20^s$ **1-GHz flux/Jy:** 12 **Size/arcmin:** 45
**Dec:** $+63°10'$ **Spectral index:** 0.45 **Type:** S

Has been called G127.3+0.7.

**Radio:** Distinct shell, with bright central source.
**Optical:** Detected.
**Point sources:** Flat radio spectrum (extragalactic) source at centre of remnant.
**Distance:** 1.2–1.3 kpc if associated with NGC 559.

**References:**


Caswell 1977, MNRAS, 181, 789. Half-Mile Telescope at 1.42 GHz ($3'.5 \times 3'.9$), plus other observations of central source.
Pauls 1977, A&A, 59, L13. Effelsberg 100-m at 1.4 GHz ($9' : S = 8 \pm 1$ Jy).
Salter *et al.* 1978, A&A, 66, 77. Effelsberg 100-m at 2.7 GHz ($4'.4$), plus 5 and 8.7 GHz of the central source.
Reich *et al.* 1979, A&A, 78, L13. Effelsberg 100-m at 1.4 GHz ($9' : S = 10.8 \pm 1.3$ Jy).
Pauls *et al.* 1982, A&A, 112, 120. WSRT at 610 MHz ($56'' \times 62''$) and HI absorption to the point source with the VLA.
Geldzahler & Shaffer 1982, ApJ, 260, L69. Observations of central source.
Fürst *et al.* 1984, A&A, 133, 11. Effelsberg 100-m at 2.7 GHz ($4'.4$) and 4.8 GHz ($2'.6$).
Goss & van Gorkom 1984, JApA, 5, 425. WSRT HI absorption of central source.
Joncas *et al.* 1989, A&A, 219, 303. DRAO at 408 MHz ($3'.5 \times 3'.9$ : $S$ = 17.9±2.0 Jy) and 1.4 GHz ($1'.13 \times 1'.0$ : $S$ = 10.1±0.8 Jy), plus review of flux densities.
Xilouris *et al.* 1993, A&A, 270, 393. Optical imaging.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz ($14'.5 : S = 14.6 \pm 0.8$ Jy).
Kaplan *et al.* 2004, ApJS, 153, 269. Chandra limits for any compact sources.
Leahy & Tian 2006, A&A, 451, 251. CGPS at 408 MHz ($3'.4 \times 3'.8 : S = 17.1 \pm /1.7$ Jy) and 1.4 GHz ($1'.0 \times 1'.2 : S = 10.0 \pm /0.8$ Jy).
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim 3' : S = 15.9 \pm 1.0$ Jy) and 1420 MHz ($\sim 1' : S = 9.7 \pm 0.6$ Jy), including polarisation and review of flux densities.
Sun *et al.* 2007, A&A, 463, 993. Urumqi 25-m at 5 GHz ($9'.5 : S = 6.3 \pm 0.7$ Jy), including polarisation.
*see also:* Sun *et al.* 2007, A&A, 469, 1003. Erratum.

## G130.7+3.1 3C58, SN1181

**RA:** $02^h05^m41^s$ **1-GHz flux/Jy:** 33 **Size/arcmin:** 9×5
**Dec:** +64°49′ **Spectral index:** 0.07 **Type:** F

This is the remnant of the SN of AD1181.

**Radio:** Filled-centre, highly polarised, with high frequency turnover.
**Optical:** Faint filaments.
**X-ray:** Centrally brightened, with faint jet.
**Point sources:** Central pulsar.
**Distance:** HI absorption indicates 2 kpc.

**References:**


Green *et al.* 1975, A&A, 44, 187. Effelsberg 100-m at 15.0 GHz (58″ : $S$=26.7±0.5 Jy).
Wilson & Weiler 1976, A&A, 49, 357. WSRT at 610 MHz (58″×64″), 1.4 GHz (24″×27″) and 5 GHz (7″×8″).
van den Bergh 1978, ApJ, 220, L9. Optical observations.
Becker *et al.* 1982, ApJ, 255, 557. X-ray observations.
Green & Gull 1982, Nature, 299, 606. HI absorption distance.
Fesen 1983, ApJ, 270, L53. Optical spectra.
Reynolds & Aller 1985, AJ, 90, 2312. VLA at 1.4 GHz (2′), for limits of shell.
Davelaar *et al.* 1986, ApJ, 300, L59. EXOSAT spectrum.
Green 1986, MNRAS, 218, 533. 151 MHz observations (1.′2×1.′3 : $S$ = 36±4 Jy), plus 2.7 GHz (4″), plus Einstein observations for limit on shell.
Green 1987, MNRAS, 225, 11P. Flux density increase at 408 MHz.
Morsi & Reich 1987, A&AS, 69, 533. Effelsberg 100-m at 32 GHz (26.″5 : $S$=24.2±1.4 Jy).
Reynolds & Aller 1988, ApJ, 327, 845. VLA at 1.4 (2.″4) and 4.9 GHz (2.″5).
Salter *et al.* 1989, ApJ, 338, 171. NRAO 12-m at 84.2 GHz (90″ : $S$=15.0±2.0 Jy), plus review of flux densities.
Asaoka & Koyama 1990, PASJ, 42, 625. Ginga X-ray spectrum.
Green & Scheuer 1992, MNRAS, 258, 833. IRAS upper limits.
Roberts *et al.* 1993, A&A, 274, 427. HI absorption.
Wallace *et al.* 1994, A&A, 286, 565. HI of surroundings.
Helfand *et al.* 1995, ApJ, 453, 741. ROSAT observations.
Torii *et al.* 2000, PASJ, 52, 875. ASCA observations.
Bietenholz *et al.* 2001, ApJ, 560, 772. VLA at 74 MHz (26″ : $S$=33.6 Jy) and 327 MHz (8.″2 : $S$=33.9 Jy), for spectral index and expansion studies.
Bocchino *et al.* 2001, A&A, 369, 1078. XMM observations.
Murray *et al.* 2002, ApJ, 568, 226. Chandra pulsar detection.
Camilo *et al.* 2002, ApJ, 571, L41. Pulsar detection in radio.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 32 GHz (26″) for polarised intensity.
Slane *et al.* 2002, ApJ, 571, L45. Chandra observations.
Slane *et al.* 2004, ApJ, 616, 403. Deep Chandra imaging.
Bietenholz 2006, ApJ, 645, 1180. VLA at 1.4 GHz (1.″36) for expansion studies.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼3′ : $S$ = 32.2±2.0 Jy) and 1420 MHz (∼ 1′ : $S$ = 31.9±1.0 Jy), including polarisation and review of flux densities.
Gotthelf *et al.* 2007, ApJ, 654, 267. XMM observations.
Slane *et al.* 2008, ApJ, 676, L33. Spitzer and other IR observations.
Fesen *et al.* 2008, ApJS, 174, 379. Optical observations for proper motion studies.
Shearer & Neustroev 2008, MNRAS, 390, 235. Optical observations of pulsar nebula.
Shibanov *et al.* 2008, A&A, 486, 273. Optical observations of pulsar nebula.
Abdo *et al.* 2009, ApJ, 699, L102. Fermi observations of pulsar.
Livingstone *et al.* 2009, ApJ, 706, 1163. Pulsar observations.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 31.7±3.0 Jy) including polarisation and review of flux densities.
Bietenholz *et al.* 2013, MNRAS, 431, 2590. Proper motion study of pulsar.
Kothes *et al.* 2013, A&A, 560, A18. CGPS HI observations for distance.

## G132.7+1.3 HB3

**RA:** $02^h17^m40^s$ **1-GHz flux/Jy:** 45 **Size/arcmin:** 80
**Dec:** $+62°45'$ **Spectral index:** 0.6 **Type:** S

Has been called G132.4+2.2.

**Radio:** Faint shell, adjacent to W3/4/5 complex.
**Optical:** Complete, filamentary shell, shock excited spectra.
**X-ray:** Partial shell.
**Point sources:** Pulsar nearby.
**Distance:** Interaction with surroundings suggests 2.2 kpc.

**References:**


van den Bergh *et al.* 1973, ApJS, 26, 19. Optical observations.
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz ($5'$ : $S=33.8\pm7.0$ Jy).
d'Odorico & Sabbadin 1977, A&AS, 28, 439. Optical spectra.
Read 1981, MNRAS, 194, 863. Radio at 151 MHz ($4'.4$) and 1.4 GHz ($2'$) showing HI shell.
Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
Fesen & Gull 1983, PASP, 95, 196. Optical image.
Leahy *et al.* 1985, ApJ, 294, 183. Einstein observations.
Landecker *et al.* 1987, AJ, 94, 111. DRAO at 408 MHz ($3'.5\times4'$ : $S=75\pm15$ Jy), plus review of flux densities.
Routledge *et al.* 1991, A&A, 247, 529. DRAO at 1.4 GHz ($1'.0\times1'.1$) for HI, plus CO observations.
Fesen *et al.* 1995, AJ, 110, 2876. Optical imaging and spectroscopy, DRAO at 408 MHz ($3'.5\times4'$) and 1.4 GHz ($1'.0\times1'.1$).
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA detection of compact OH emission.
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz ($14'.5$ : $S=51.5\pm3.5$ Jy).
Tian & Leahy 2005, A&A, 436, 187. CGPS at 408 MHz ($3'.4\times3'.8$ :) and 1.4 GHz ($1'.0\times1'.1$), for spectral index studies.
*see also:* Tian & Leahy 2006, A&A, 451, 991. Erratum.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim3'$ : $S=61\pm9$ Jy) and 1420 MHz ($\sim1'$ : $S=29.4\pm2.7$ Jy), including review of flux densities.
Lazendic & Slane 2006, ApJ, 647, 350. X-ray observations.
Green 2007, BASI, 35, 77. Review of radio spectrum.
Shi *et al.* 2008, A&A, 487, 601. Urumqi 25-m at 4.8 GHz ($9'.5$), plus other survey observations for spectral studies.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.


## G152.4−2.1

**RA:** $04^h07^m50^s$ **1-GHz flux/Jy:** 3.5? **Size/arcmin:** 100×95
**Dec:** $+49°11'$ **Spectral index:** 0.7? **Type:** S

**Radio:** Bilateral shell.

**References:**


Foster *et al.* 2013, A&A, 549, A107. Effelsberg 100-m at 2.7 GHz, including polarisation, plus various radio survey observations.


## G156.2+5.7

**RA:** $04^h58^m40^s$ **1-GHz flux/Jy:** 5 **Size/arcmin:** 110
**Dec:** $+51°50'$ **Spectral index:** 0.5 **Type:** S

**Radio:** Faint shell, brighter in E and W.
**Optical:** Filamentary ring and smaller patchy ring.
**X-ray:** Faint shell.

**References:**


Pfeffermann *et al.* 1991, A&A, 246, L28. ROSAT detection.
Reich *et al.* 1992, A&A, 256, 214. Effelsberg 100-m at 1.4 ($9'$ : $S=4.2\pm1.0$ Jy) and 2.7 GHz ($4'.3$ : $S=3.0\pm1.0$ Jy), plus HI and IRAS.
Yamauchi *et al.* 1993, PASJ, 45, 795. Hard X-ray observations.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Yamauchi *et al.* 1999, PASJ, 51, 13. ASCA observations of some regions.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz, including polarisation.
Pannuti & Allen 2004, AdSpR, 33, 434. ASCA and RXTE observations.
Kaplan *et al.* 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz ($\sim3'$ : $S=8.1\pm1.3$ Jy), including review of flux densities.
Xu *et al.* 2007, A&A, 470, 969. Urumqi 25-m at 4.8 GHz ($9'.5$ : $S=2.5\pm0.5$ Jy), including polarisation.
Gerardy & Fesen 2007, MNRAS, 376, 929. Optical observations.
Katsuda *et al.* 2009, PASJ, 61, S155. Suzaku observations.
Uchida *et al.* 2012, PASJ, 64, 61. Suzaku observations.

## G159.6+7.3

**RA:** $05^h20^m00^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 240×180?
**Dec:** +50°00′ **Spectral index:** ? **Type:** S

**Optical:** Large, faint shell.

**X-ray:** Possible emission.

**References:**

Fesen & Milisavljevic 2010, AJ, 140, 1163. Hα and other observations.

## G160.9+2.6 HB9

**RA:** $05^h01^m00^s$ **1-GHz flux/Jy:** 110 **Size/arcmin:** 140×120
**Dec:** +46°40′ **Spectral index:** 0.64 **Type:** S

Has been called G160.5+2.8 and G160.4+2.8.

**Radio:** Large, filamentary shell.

**Optical:** Incomplete shell.

**X-ray:** Centrally brightened.

**Point sources:** Pulsar within boundary of the remnant, plus several nearby compact radio sources.

**Distance:** Various observations suggests less than 4 kpc.

**References:**

d'Odorico & Sabbadin 1977, A&AS, 28, 439. Optical spectra.
Damashek *et al.* 1978, ApJ, 225, L31. Pulsar.
Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
Dwarakanath *et al.* 1982, JApA, 3, 207. Radio observations at 34.5 MHz (26′×40′ : $S = 750\pm150$ Jy), plus review of flux densities.
van Gorkom *et al.* 1982, MNRAS, 198, 757. WSRT HI absorption to nearby point source.
Seaquist & Gilmore 1982, AJ, 87, 378. VLA observations of nearby source.
Leahy 1987, ApJ, 322, 917. Einstein observations.
Leahy & Roger 1991, AJ, 101, 1033. DRAO at 408 MHz (3.′5×4.′8) and 1.4 GHz (1.′0×1.′4), including HI and discussion of distance.
Yamauchi & Koyama 1993, PASJ, 45, 545. Hard X-ray observations.
Leahy & Aschenbach 1995, A&A, 293, 853. ROSAT observations.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Leahy *et al.* 1998, A&A, 339, 601. 232 MHz (3.′8×5.′2), 151 MHz (4.′2×5.′8) and Effelsberg 100-m at 4.7 GHz (2.′5) for spectral index studies.
Roger *et al.* 1999, A&AS, 137, 7. 22 MHz flux density ($S = 1130\pm340$ Jy).
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14.′5 : $S = 91\pm3$ Jy).
Kaplan *et al.* 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S = 102\pm7$ Jy) and 1420 MHz (∼ 1′ : $S = 54.0\pm2.9$ Jy), including polarisation and review of flux densities.
Leahy & Tian 2007, A&A, 461, 1013. CGPS at 408 MHz (2.′8×3.′9 : $S = 117.8\pm5.3$ Jy) and 1.4 GHz (58″×80″ : $S = 65.9\pm3.4$ Jy).
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S = 34\pm3$ Jy), including polarisation and review of flux densities.
Gosachinskii 2013, AstL, 39, 179. HI observations of region.

## G166.0+4.3

VRO 42.05.01

**RA:** $05^h26^m30^s$ **1-GHz flux/Jy:** 7 **Size/arcmin:** 55×35
**Dec:** +42°56′ **Spectral index:** 0.37 **Type:** S

**Radio:** Two arcs of strikingly different radii.
**Optical:** Nearly complete ring.
**X-ray:** Predominantly in SW.
**Distance:** HI indicates 4.5 kpc.

**References:**


van den Bergh *et al.* 1973, ApJS, 26, 19. Optical observations.
Willis 1973, A&A, 26, 237. NRAO 300-ft at 2.7 GHz (5′ : $S$ = 5.2±1.0 Jy).
Lozinskaya 1979, AuJPh, 32, 113. Hα interferometry.
Landecker *et al.* 1982, ApJ, 261, L41. DRAO at 1.4 GHz (1.′0×1.′4), plus review of flux densities.
Fesen *et al.* 1983, ApJS, 51, 337. Deep [OIII] imagery.
Pineault *et al.* 1985, A&A, 151, 52. VLA at 1.4 GHz (16″×20″) of part of remnant, and optical observations.
Fesen *et al.* 1985, ApJ, 292, 29. Optical spectra.
Braun & Strom 1986, A&AS, 63, 345. WSRT HI Observations.
Pineault *et al.* 1987, ApJ, 315, 580. DRAO and VLA combined at 1.4 GHz (20″).
Landecker *et al.* 1989, MNRAS, 237, 277. DRAO at 1.4 GHz (1.′0×1.′4), including HI.
Burrows & Guo 1994, ApJ, 421, L19. ROSAT images and spectra.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Guo & Burrows 1997, ApJ, 480, L51. ASCA observations.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Leahy & Tian 2005, A&A, 440, 929. CGPS at 408 MHz (3.′4×5.′0) and 1.4 GHz (1.′0×1.′4), for spectral index studies. *see also:* Tian & Leahy 2006, A&A, 451, 991. Erratum.
Kothes *et al.* 2006, A&A, 457, 1081. CGPS at 408 MHz (∼ 3′ : $S$ = 8.1±0.9 Jy) and 1420 MHz (∼ 1′ : $S$ = 5.1±0.4 Jy), including polarisation and review of flux densities.
Bocchino *et al.* 2009, A&A, 498, 139. XMM observations.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 3.3±0.3 Jy), including polarisation and review of flux densities.
Araya *et al.* 2013, MNRAS, 434, 2202. Fermi observations.


## G178.2−4.2

**RA:** $05^h35^m05^s$ **1-GHz flux/Jy:** 2 **Size/arcmin:** 72×62
**Dec:** +28°11′ **Spectral index:** 0.5 **Type:** S

**Radio:** Faint shell, brighter in NE.

**References:**


Gao *et al.* 2011, A&A, 532, A144. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 1.0±0.1 Jy), plus other observations.


## G179.0+2.6

**RA:** $05^h53^m40^s$ **1-GHz flux/Jy:** 7 **Size/arcmin:** 70
**Dec:** +31°05′ **Spectral index:** 0.4 **Type:** S?

**Radio:** Thick shell, with background extragalactic sources near centre.

**References:**


Fürst & Reich 1986, A&A, 154, 303. Effelsberg 100-m at 1.4 (9.′4), 2.7 (4.′3) and 4.75 GHz (2.′4).
Fürst *et al.* 1989, A&A, 223, 66. Observations of central, extragalactic source.
Lorimer *et al.* 1998, A&A, 331, 1002. Pulsar search.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9.′5 : $S$ = 3.2±0.3 Jy), including polarisation and review of flux densities.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

## G180.0−1.7 S147

**RA:** $05^h39^m00^s$ **1-GHz flux/Jy:** 65 **Size/arcmin:** 180
**Dec:** +27°50′ **Spectral index:** varies **Type:** S

**Radio:** Large faint shell, with spectral break.
**Optical:** Wispy ring.
**X-ray:** Possible detection.
**Point sources:** Pulsar within boundary, with faint wind nebula.
**Distance:** Optical absorption towards stars indicates $> 0.36$ and $< 0.88$ kpc.

**References:**


van den Bergh *et al.* 1973, ApJS, 26, 19. Optical observations.
Sofue *et al.* 1980, PASJ, 32, 1. Effelsberg 100-m at 5 GHz (2′.6) of parts.
Kundu *et al.* 1980, A&A, 92, 225. Effelsberg 100-m at 2.7 GHz (5′.5 : $S = 34.9 \pm 4$ Jy) and 1.6 GHz (10′ : $S = 60.2 \pm 6$ Jy).
Angerhofer & Kundu 1981, AJ, 86, 1003. Arecibo at 430 MHz (9′ : $S = 97 \pm 20$ Jy).
Fürst *et al.* 1982, A&A, 115, 428. Observations of compact radio sources near the remnant.
Fesen *et al.* 1985, ApJ, 292, 29. Optical spectra.
Fürst & Reich 1986, A&A, 163, 185. Effelsberg 100-m at 1.4, 2.7 and 4.7/5.0 GHz (9′.4, 4′.3 and 2′.4/2′.6).
Sauvageot *et al.* 1990, A&A, 227, 183. EXOSAT possible detection.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Anderson *et al.* 1996, ApJ, 468, L55. Pulsar detection.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz.
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′.5 : $S = 77 \pm 10$ Jy).
Romani & Ng 2003, ApJ, 585, L41. Chandra of pulsar.
Kramer *et al.* 2003, ApJ, 593, L31. Pulsar observations.
Sallmen & Welsh 2004, A&A, 426, 555. Optical absorption towards background stars.
Drew *et al.* 2005, MNRAS, 362, 753. Hα imaging.
Ng *et al.* 2007, ApJ, 654, 487. Pulsar and wind nebula observations.
Xiao *et al.* 2008, A&A, 482, 783. Urumqi 25-m at 4.8 GHz (9′.5 : $S = 15.4 \pm 3.0$ Jy) and Effelsberg 100-m at 2.6 GHz (4′.4 : $S = 34.6 \pm 4.0$ Jy).
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.
Katsuta *et al.* 2012, ApJ, 752, 135. Fermi observations.


## G182.4+4.3

**RA:** $06^h08^m10^s$ **1-GHz flux/Jy:** 0.5 **Size/arcmin:** 50
**Dec:** +29°00′ **Spectral index:** 0.4 **Type:** S

**Radio:** Incomplete shell.
**Optical:** Brighter in S and NW.
**X-ray:** Diffuse emission.

**References:**


Kothes *et al.* 1998, A&A, 331, 661. Effelsberg 100-m at 1.4, 2.7, 4.9 and 10.5 GHz (9′.4 : $S = 0.36 \pm 0.08$ Jy, 4′.4 : $S = 0.25 \pm 0.04$ Jy, 2′.5 : $S = 0.20 \pm 0.02$ Jy and 1′.2 : $S = 0.15 \pm 0.03$ Jy), plus X-ray upper limit.
Reich 2002, in NSPS, p1. Effelsberg 100-m at 2.7 GHz and 4.9 GHz (3′).
Sun *et al.* 2011, A&A, 536, A83. Urumqi 25-m at 5 GHz (9′.5 : $S = 0.26 \pm 0.5$ Jy) including polarisation and review of flux densities.
Sezer *et al.* 2012, MNRAS, 427, 1168. Optical and XMM observations.
Jeong *et al.* 2012, Ap&SS, 342, 389. CO observations of region.

## G184.6−5.8 Crab Nebula, 3C144, SN1054

**RA:** $05^h34^m31^s$ **1-GHz flux/Jy:** 1040 **Size/arcmin:** 7×5
**Dec:** +22°01′ **Spectral index:** 0.30 **Type:** F

This is the remnant of the SN of AD1054.

**Radio:** Filled-centre, central pulsar, with faint 'jet' (or tube) extending from the N edge.
**Optical:** Strongly polarised filaments, diffuse synchrotron emission, with 'jet' faintly visible.
**X-ray:** Central 'torus' around the pulsar.
**Point sources:** Pulsar powering the remnant.
**Distance:** Proper motions and radial velocities give 2 kpc.

**References:**


Velusamy 1984, Nature, 308, 251. VLA at 1.4 GHz, radio detection of 'jet'.
Velusamy 1985, MNRAS, 212, 359. VLA at 1.4 GHz (15″).
Aller & Reynolds 1985, ApJ, 293, L73. Flux density decrease.
Fesen & Gull 1986, ApJ, 306, 259. Deep [OIII] imagery of 'jet'.
Marcelin *et al.* 1990, A&A, 228, 471. Optical of 'jet'.
Hester *et al.* 1990, ApJ, 357, 539. Optical and IR images.
Hickson & van den Bergh 1990, ApJ, 365, 224. Optical polarisation.
Bietenholz & Kronberg 1990, ApJ, 357, L13. VLA at 1.4 GHz (1.″8).
Bietenholz & Kronberg 1992, ApJ, 393, 206. VLA at 1.5 and 5 GHz (1.″8) and 1.5 and 14 GHz (6.″5) for spectral studies.
Fesen & Staker 1993, MNRAS, 263, 69. [OIII] imaging of 'jet', and proper motion studies.
Kassim *et al.* 1993, AJ, 106, 2218. VLA at 74 MHz (20″).
Véron-Cetty & Woltjer 1993, A&A, 270, 370. Continuum and [OIII] photometry.
Wallace *et al.* 1994, A&A, 286, 565. HI of surroundings.
Frail *et al.* 1995, ApJ, 454, L129. VLA at 333 MHz (20″) for limits on shell.
Bietenholz *et al.* 1997, ApJ, 490, 291. Comparison of VLA observations at 74 MHz, 327 MHz, 1.5 GHz and 5 GHz for spectral index studies.
Blair *et al.* 1997, ApJS, 109, 473. HST imaging.
Fesen *et al.* 1997, AJ, 113, 354. Limits on Hα halo.
van der Meulen *et al.* 1998, A&A, 330, 321. γ-ray observations.
Tanimori *et al.* 1998, ApJ, 492, L33. γ-ray observations.
Nugent 1998, PASP, 110, 831. Optical expansion.
Sankrit *et al.* 1998, ApJ, 504, 344. HST images.
Wallace *et al.* 1999, ApJS, 124, 181. DRAO at 1.4 GHz (1.′0×2.′8), plus Effelsberg 100-m, for HI studies.
Greiveldinger & Aschenbach 1999, ApJ, 510, 305. X-ray variability of torus.
Weisskopf *et al.* 2000, ApJ, 536, L81. Chandra observations.
Sollerman *et al.* 2000, ApJ, 537, 861. HST observations.
Aharonian *et al.* 2000, ApJ, 539, 317. γ-ray observations.
Oser *et al.* 2001, ApJ, 547, 949. γ-ray observations.
Willingale *et al.* 2001, A&A, 365, L212. XMM observations.
Douvion *et al.* 2001, A&A, 373, 281. ISO observations.
Bietenholz *et al.* 2001, ApJ, 560, 254. Multi-epoch VLA observations, showing variations near the pulsar.
Bandiera *et al.* 2002, A&A, 386, 1044. 1.3 mm observations.
Hester *et al.* 2002, ApJ, 577, L49. HST and Chandra multi-epoch observations.
Atkins *et al.* 2003, ApJ, 595, 803. γ-ray observations.
Green *et al.* 2004, MNRAS, 355, 1315. Sub-mm and ISO observations.
Mori *et al.* 2004, ApJ, 609, 186. Chandra observations.
Čadež *et al.* 2004, ApJ, 609, 797. Optical observations.
Aharonian *et al.* 2004, ApJ, 614, 897. γ-ray observations.
Bietenholz *et al.* 2004, ApJ, 615, 794. VLA at 5 GHz (1.″4) and HST multi-epoch observation for proper motion studies.
Melatos *et al.* 2005, ApJ, 633, 931. Multi-epoch near-IR observations central region.
Seward *et al.* 2006, ApJ, 636, 873. Chandra observations of scattering halo.
Temim *et al.* 2006, AJ, 132, 1610. Spitzer observations.
*see also:* Temim *et al.* 2009, AJ, 137, 5155. Erratum.
Aharonian *et al.* 2006, A&A, 457, 899. γ-ray observations
Seward *et al.* 2006, ApJ, 652, 1277. Chandra observations.
MacAlpine *et al.* 2007, AJ, 133, 81. Optical spectroscopy.
Kaplan *et al.* 2008, ApJ, 677, 1201. HST proper motion of pulsar.
Rudie *et al.* 2008, MNRAS, 384, 1200. [OIII] observations of 'jet', for proper motion.
Hurley-Walker *et al.* 2009, MNRAS, 396, 365. Radio observations at 14 to 18 GHz.
Tziamtzis *et al.* 2009, A&A, 497, 167. Limits on Hα halo.
Carlebois *et al.* 2010, AJ, 139, 2083. Optical imaging spectroscopy.
Aumount *et al.* 2010, A&A, 514, A70. IRAM 30-m at 150 GHz (16.″7 : $S$=244±24 Jy) and GBT at 90 GHz (9.″3).
Loh *et al.* 2012, MNRAS, 421, 789. IR observations of $H_2$.
Lundqvist & Tziamtzis 2012, MNRAS, 423, 1571. Optical limits on outer shell.
Temim *et al.* 2012, ApJ, 753, 72. Spitzer observations of dust.
Gomez *et al.* 2012, ApJ, 760, 96. Herschel IR and sub-mm observations of dust.
Loll *et al.* 2013, ApJ, 765, 152. HST optical line and continuum observations.
Barlow *et al.* 2013, Science, 342, 1343. Herschel far-IR spectroscopy.

## G189.1+3.0 IC443, 3C157

**RA:** $06^h17^m00^s$ **1-GHz flux/Jy:** 160 **Size/arcmin:** 45
**Dec:** $+22°34'$ **Spectral index:** 0.36 **Type:** C

**Radio:** Limb-brightened to NE, with faint extension to the E.
**Optical:** Brightest to the NE, with faint filaments outside the NE boundary.
**X-ray:** Shell, brightest to the NE, plus compact source with nebula.
**Point sources:** X-ray source and nebula in S.
**Distance:** Mean optical velocity suggests 0.7–1.5 kpc, association with S249 gives 1.5–2 kpc.

**References:**


Fesen 1984, ApJ, 281, 658. Optical of filament to far NE.
Erickson & Mahoney 1985, ApJ, 290, 596. TPT at 4 frequencies between 31 and 74 MHz ($13'\times11'$ to $5\farcm4\times4\farcm7$), plus review of flux densities.
Braun & Strom 1986, A&A, 164, 193. WSRT at 327 MHz ($72''\times185''$) and 1.4 GHz ($17''\times43''$), plus HI and IRAS.
Green 1986, MNRAS, 221, 473. 151 MHz observations ($1\farcm2\times3\farcm1$) and Half-Mile Telescope at 1.4 GHz ($2\farcm1\times5\farcm4$).
Mufson *et al.* 1986, AJ, 92, 1349. Radio, IR, optical, UV and X-ray comparison, including VLA at 1.6 GHz ($3\farcs8\times3\farcs3$ and $40''$).
Petre *et al.* 1988, ApJ, 335, 215. Einstein and other X-ray observations.
Dickel *et al.* 1989, AJ, 98, 1363. VLA at 1.4 GHz ($1\farcs1\times1\farcs2$) of NE.
Burton *et al.* 1990, ApJ, 355, 197. IR observations of shocked $O_2$.
Wood *et al.* 1991, AJ, 102, 224. VLA at 5 GHz ($3\farcs6\times3\farcs8$) of northeast, including polarisation.
Wang & Scoville 1992, ApJ, 386, 158. Observations of shocked molecular species.
Turner *et al.* 1992, ApJ, 399, 114. Observations of shocked molecular species.
Dickman *et al.* 1992, ApJ, 400, 203. Observations of shocked molecular species.
van Dishoeck *et al.* 1993, A&A, 279, 541. Observations of shocked molecular species.
Asaoka & Aschenbach 1994, A&A, 284, 573. X-ray, including possible overlapping remnant.
Tauber *et al.* 1994, ApJ, 421, 570. Observations of shocked molecular species.
Frail *et al.* 1996, AJ, 111, 1651. OH maser emission.
Claussen *et al.* 1997, ApJ, 489, 143. VLA of associated OH masers.
Seta *et al.* 1998, ApJ, 505, 286. CO observations of surroundings.
Claussen *et al.* 1999, ApJ, 522, 349. High resolution observations of OH masers.
Oliva *et al.* 1999, A&A, 341, L75. ISO observations.
Cesarsky *et al.* 1999, A&A, 348, 945. ISO observations of shocked molecular $H_2$.
Bocchino & Bykov 2000, A&A, 362, L29. BeppoSAX observations.
Rho *et al.* 2001, ApJ, 547, 885. ISO and 2Mass IR spectroscopy and imaging.
Olbert *et al.* 2001, ApJ, 554, L205. Chandra of compact X-ray source and surrounding nebula.
Bocchino & Bykov 2001, A&A, 376, 248. XMM of compact X-ray source and surrounding nebula.
Bocchino & Bykov 2003, A&A, 400, 203. XMM observations of compact sources.
Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz ($14\farcm5 : S = 160\pm5$ Jy).
Welsh & Sallmen 2003, A&A, 408, 545. Optical absorption studies.
Leahy 2004, AJ, 127, 2277. DRAO at 408 MHz ($3\farcm3\times8\farcm6$) and 1.4 GHz ($1\farcm0\times2\farcm6$), for spectral index studies.
*see also:* Leahy 2004, AJ, 128, 1478. Addendum.
Snell *et al.* 2005, ApJ, 620, 758. Molecular line and IR observations of shocked material.
Bykov *et al.* 2005, ApJ, 624, L41. Chandra observations of compact source.
Kawasaki *et al.* 2005, ApJ, 631, 935. ASCA observations.
Gaensler *et al.* 2006, ApJ, 648, 1037. Chandra of X-ray source and nebula.
Hewitt *et al.* 2006, ApJ, 652, 1288. GBT at 1.6 and 1.7 GHz ($7\farcm2$) for OH, and VLA at 330 MHz ($74''\times64''$).
Neufeld *et al.* 2007, ApJ, 664, 890. Spitzer observations.
Rosado *et al.* 2007, AJ, 133, 89. Observations of shocked $H_2$.
Albert *et al.* 2007, ApJ, 664, L87. γ-ray observations.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Lee *et al.* 2008, AJ, 135, 796. VLA at 1.4 GHz ($39''\times42''$) including HI.
Troja *et al.* 2008, A&A, 485, 777. XMM observations.
Bocchino *et al.* 2008, AdSpR, 41, 396. Integral observations.
Bykov *et al.* 2008, ApJ, 676, 1050. XMM, Chandra and Spitzer observations.
Bocchino *et al.* 2009, A&A, 498, 139. XMM observations.
Hirschauer *et al.* 2009, ApJ, 696, 1533. Optical absorption spectroscopy.
Acciari *et al.* 2009, ApJ, 698, L133. γ-ray observations.
Yamaguchi *et al.* 2009, ApJ, 705, L6. Suzaku observations.
Koo *et al.* 2010, AJ, 140, 262. HI Zeeman splitting observations.
Tavani *et al.* 2010, ApJ, 710, L151. γ-ray observations.
Yuan & Neufeld 2011, ApJ, 726, 76. Spitzer observations.
Xu *et al.* 2011, ApJ, 727, 81. CO observations of region.
Shinn *et al.* 2011, ApJ, 732, 124. AKARI observations of $H_2$.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz ($9\farcm5 : S = 85\pm9$ Jy), including polarisation and review of flux densities.
Lee *et al.* 2012, ApJ, 749, 34. CO and $HCO^+$ of region.
Taylor *et al.* 2012, ApJ, 750, L15. Optical absorption of background stars.
Yuan *et al.* 2012, ApJ, 753, 126. Spitzer spectroscopy.
Shinn *et al.* 2012, ApJ, 759, 34. AKARI observations of $H_2$.
Satterfield *et al.* 2012, AJ, 144, 27. Optical spectroscopy.
Ackermann *et al.* 2013, Science, 339, 807. Fermi observations.
Hezareth *et al.* 2013, A&A, 558, A45. CO observations, including polarisation, of region.
Kokasho *et al.* 2013, ApJ, 768, L8. IR observations of [FeII], plus AKARI and Spitzer observations.

## G190.9−2.2

**RA:** $06^h01^m55^s$ **1-GHz flux/Jy:** 1.3? **Size/arcmin:** 70×60
**Dec:** +18°24′ **Spectral index:** 0.7? **Type:** S

**Radio:** Incomplete shell.

**References:**

Foster *et al.* 2013, A&A, 549, A107. Various radio survey observations.

## G192.8−1.1 PKS 0607+17

**RA:** $06^h09^m20^s$ **1-GHz flux/Jy:** 20? **Size/arcmin:** 78
**Dec:** +17°20′ **Spectral index:** 0.6? **Type:** S

Has been called G193.3–1.5. Has been regarded as part of the Origem Loop, a supposed larger remnant.

**Radio:** In complex region.

**Optical:** Encompasses S261 and S254–258.

**References:**

Milne & Dickel 1974, AuJPh, 27, 549. Parkes 64-m at 2.7 GHz (9′ : $S$ = 13±15% Jy).
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo at 318 MHz (15′ : $S$ = 74±32 Jy), and $S_{610\ MHz}$ = 40 Jy.
Caswell 1985, AJ, 90, 1076. DRAO at 1.4 GHz (1′×3′.3 : $S$ = 18±3 Jy).
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Welsh *et al.* 2001, A&A, 372, 516. Far-UV spectroscopy.

## G205.5+0.5 Monoceros Nebula

**RA:** $06^h39^m00^s$ **1-GHz flux/Jy:** 140 **Size/arcmin:** 220
**Dec:** +06°30′ **Spectral index:** 0.4 **Type:** S

**Radio:** In complex region, parts may be HII regions.

**Optical:** Large ring, near Rosette nebula.

**X-ray:** Possibly detected.

**Distance:** Mean optical velocity suggests 0.8 kpc, low frequency radio absorption suggests 1.6 kpc.

**References:**

Milne & Dickel 1974, AuJPh, 27, 549. Parkes 64-m at 2.7 GHz (9′).
Velusamy & Kundu 1974, A&A, 32, 375. NRAO 300-ft at 2.7 GHz (5′), part only.
Dickel & DeNoyer 1975, AJ, 80, 437. Arecibo at 111 MHz (1′ : $S$ = 462±180 Jy) and $S_{610\ MHz}$ = 245 Jy.
Davies *et al.* 1978, A&AS, 31, 271. Deep optical plates.
Lozinskaya 1981, SvAL, 7, 17. Mean optical velocity.
Graham *et al.* 1982, A&A, 109, 145. Effelsberg 100-m at 2.7 GHz (4′.4 : $S$ = 97.6±12.5 Jy), plus review of flux densities.
Fesen *et al.* 1985, ApJ, 292, 29. Optical spectra.
Leahy *et al.* 1986, MNRAS, 220, 501. Einstein observations.
Odegard 1986, ApJ, 301, 813. TPT at 20.6, 25.6 and 30.9 MHz (24′, 19′ and 16′).
Esposito *et al.* 1996, ApJ, 461, 820. Possible associated γ-ray emission.
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Oliver *et al.* 1996, A&A, 315, 578. CO observations of some of surroundings.
Jaffe *et al.* 1997, ApJ, 484, L129. γ-ray detection.
Aharonian *et al.* 2004, A&A, 417, 973. γ-ray limits.
Kaplan *et al.* 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Xiao & Zhu 2012, A&A, 545, A86. Review of radio, HI and Hα observations.

## G206.9+2.3 PKS 0646+06

**RA:** $06^h48^m40^s$ **1-GHz flux/Jy:** 6 **Size/arcmin:** 60×40
**Dec:** +06°26′ **Spectral index:** 0.5 **Type:** S?

**Radio:** Diffuse source near the Monoceros Nebula.
**Optical:** Filaments detected.
**X-ray:** Possibly detected.

**References:**


Davies & Meaburn 1978, A&A, 69, 443. Optical observations.
Nousek *et al.* 1981, ApJ, 248, 152. HEAO-1 X-ray limit.
Graham *et al.* 1982, A&A, 109, 145. Effelsberg 100-m at 2.7 GHz (4′.4 : $S$ = 4.1±0.6 Jy), plus review of flux densities.
Rosado 1982, RMxAA, 5, 127. Optical observations.
Fesen *et al.* 1985, ApJ, 292, 29. Optical spectra.
Leahy 1986, A&A, 156, 191. Einstein observations.
Odegard 1986, ApJ, 301, 813. TPT at 20.6, 25.6 and 30.9 MHz (24′, 19′ and 16′).
Biggs & Lyne 1996, MNRAS, 282, 691. Pulsar search.
Gao *et al.* 2011, A&A, 529, A159. Urumqi 25-m at 5 GHz (9′.5 : $S$ = 2.9±0.3 Jy), including polarisation and review of flux densities.


## G213.0−0.6

**RA:** $06^h50^m50^s$ **1-GHz flux/Jy:** 21 **Size/arcmin:** 160×140?
**Dec:** –00°30′ **Spectral index:** 0.4 **Type:** S

Has also been called G213.3–0.4.

**Radio:** Large, faint shell.
**Optical:** Filamentary shell.
**Point sources:** Central X-ray source

**References:**


Reich *et al.* 2003, A&A, 408, 961. Effelsberg 100-m at 863 MHz (14′.5 : $S$ = 22.0±3.7 Jy).
Stupar & Parker 2012, MNRAS, 419, 1413. Hα, radio survey and other observations.

## G260.4−3.4 Puppis A, MSH 08–44

**RA:** $08^h22^m10^s$ **1-GHz flux/Jy:** 130 **Size/arcmin:** 60×50
**Dec:** –43°00′ **Spectral index:** 0.5 **Type:** S

This remnant overlaps the Vela SNR (G263.9–3.3).

**Radio:** Angular shell, brightest to the E, poorly defined to the W.

**Optical:** Nebulosity and wisps.

**X-ray:** Brightest to the E.

**Point sources:** Central possible pulsating X-ray source.

**Distance:** Association with HI gives 2.2 kpc.

**References:**


Green 1971, AuJPh, 24, 773. Molonglo at 408 MHz (3′ : $S$ = 198±20 Jy).
Goudis & Meaburn 1978, A&A, 62, 283. Hα+[NII] optical image.
Petre *et al.* 1982, ApJ, 258, 22. Einstein observations.
Milne *et al.* 1983, MNRAS, 204, 237. FIRST at 1415 MHz (50″), large scale emission missing.
Teske & Petre 1987, ApJ, 318, 370. Coronal optical line emission.
Dubner & Arnal 1988, A&AS, 75, 363. HI and CO observations of surroundings.
Arendt *et al.* 1990, ApJ, 350, 266. MOST at 843 MHz (44″×65″), with large scale emission added, plus IR, optical and X-ray observations.
Dubner *et al.* 1991, AJ, 101, 1466. VLA at 327 MHz (43″×73″) and 1.5 GHz (43″×77″).
Arendt *et al.* 1991, ApJ, 368, 474. IR observations.
Milne *et al.* 1993, MNRAS, 261, 366. Parkes 64-m at 4.75 (4′.5 : $S$ = 59±5 Jy) and 8.4 GHz (3′ : $S$ = 38±4 Jy), plus polarisation.
Berthiaume *et al.* 1994, ApJ, 425, 132. X-ray spectroscopy.
Sutherland & Dopita 1995, ApJ, 439, 365. Spectrophotometry.
Reynoso *et al.* 1995, AJ, 110, 318. VLA at 1.4 GHz (90″) including neutral hydrogen.
Blair *et al.* 1995, ApJ, 454, L35. Far UV spectroscopy.
Petre *et al.* 1996, ApJ, 465, L43. ROSAT of central source.
Bock *et al.* 1998, AJ, 116, 1886. MOST at 843 MHz (43″×60″).
Pavlov *et al.* 1999, ApJ, 511, L45. Possible pulsation detection from central X-ray source.
Zavlin *et al.* 1999, ApJ, 525, 959. X-ray observations of central source.
Bocchino *et al.* 2000, A&A, 359, 316. Optical studies of selected filaments in N.
Woermann *et al.* 2000, MNRAS, 317, 421. OH observations.
Gaensler *et al.* 2000, ApJ, 537, L35. Radio limit for nebula around possible pulsar.
Reynoso *et al.* 2003, MNRAS, 345, 671. ATCA at 1.4 GHz (90″) for HI near central X-ray source.
Hwang *et al.* 2005, ApJ, 635, 355. Chandra observations of E edge.
Hui & Becker 2006, A&A, 454, 543. XMM and Chandra observations.
Hui & Becker 2006, A&A, 457, L33. Chandra proper motion study of central source.
Castelletti *et al.* 2006, A&A, 459, 535. VLA at 1.4 GHz (16″×34″ : $S$ = 114±8 Jy) and 327 MHz (45″×90″ : $S$ = 263±20 Jy).
Winkler & Petre 2007, ApJ, 670, 635. Chandra proper motion study of central source.
Paron *et al.* 2008, A&A, 480, 439. CO observations of E.
Hwang *et al.* 2008, ApJ, 676, 378. Suzaku observations.
Katsuda *et al.* 2008, ApJ, 678, 297. XMM observations.
Mignani *et al.* 2009, A&A, 500, 1211. Optical limits for compact X-ray source.
Katsuda *et al.* 2010, ApJ, 714, 1725. Chandra and XMM observations.
Arendt *et al.* 2010, ApJ, 725, 585. Spitzer observations.
Becker *et al.* 2012, ApJ, 755, 141. Chandra proper motion study of central X-ray source.
Katsuda *et al.* 2012, ApJ, 756, 49. XMM spectroscopy.
Hewitt *et al.* 2012, ApJ, 759, 89. Fermi and WMAP 23 to 90 GHz observations.
Dubner *et al.* 2013, A&A, 555, A9. XMM and Chandra observations.
Katsuda *et al.* 2013, ApJ, 768, 182. XMM observations.


## G261.9+5.5

**RA:** $09^h04^m20^s$ **1-GHz flux/Jy:** 10? **Size/arcmin:** 40×30
**Dec:** –38°42′ **Spectral index:** 0.4? **Type:** S

**Radio:** Faint shell with little limb brightening.

**References:**


Hill 1967, AuJPh, 20, 297. Parkes 64-m at 2650 MHz (7′.5 : $S$ = 7 Jy) also $S_{1410\ MHz}$ = 8 Jy, $S_{81.5\ MHz}$ = 25 Jy.
Colomb & Dubner 1980, A&A, 82, 244. Argentine 30-m dish at 1.4 GHz, for HI possibly associated with remnant.
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×71″).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G263.9–3.3 Vela (XYZ)

**RA:** $08^h34^m00^s$ **1-GHz flux/Jy:** 1750 **Size/arcmin:** 255
**Dec:** –45°50′ **Spectral index:** varies **Type:** C

This refers to the whole Vela XYZ complex, of which X has at times been classified as a separate (filled-centre) remnant. This remnant is overlapped by G260.4–3.4 and G266.2–1.2.

**Radio:** Large shell, with flatter spectrum component (Vela X), and pulsar nebula.

**Optical:** Filaments.

**X-ray:** Patchy shell, with extensions, central nebula and pulsar.

**Point sources:** Pulsar within Vela X, with one-sided 'jet'.

**Distance:** Vela pulsar parallax gives 0.3 kpc, optical spectra and HI studies suggest 0.25 kpc.


**References:**

Milne 1968, AuJPh, 21, 201. Parkes 64-m at various frequencies, including 408 MHz (48′ : $S = 2300\pm300$ Jy), 635 MHz (31′ : $S = 2360\pm300$ Jy), 1410 MHz (14′ : $S = 1640\pm300$ Jy) and 2650 MHz (7.′5 : $S = 1400\pm250$ Jy), plus discussion of the distance.

Milne 1980, A&A, 81, 293. Maps of Vela X with Parkes 64-m at 1.66, 2.7 and 5 GHz (12′, 8.′4 and 4.′4).

Weiler & Panagia 1980, A&A, 90, 269. Clarificaton of notation of this region and review previous observations.

Bignami & Caraveo 1988, ApJ, 325, L5. Pulsar proper motion from optical observations.

Dwarakanath 1991, JApA, 12, 199. Gauribidanur 'T' array at 34.5 MHz (26′×84′ : $S = 1800$ Jy for Vela X and $S = 3900$ Jy for Vela YZ), plus review of flux densities.

Bietenholz *et al.* 1991, ApJ, 376, L41. VLA at 5 GHz in vicinity of pulsar.

Willmore *et al.* 1992, MNRAS, 254, 139. Hard X-ray observations.

Dubner *et al.* 1992, A&AS, 96, 505. Argentine 30-m at 1.4 GHz (30′) of surrounding HI.

Strom *et al.* 1995, Nature, 373, 590. Radio of X-ray extensions.

Markwardt & Ögelman 1995, Nature, 375, 40. X-ray jet from pulsar.

Jenkins & Wallerstein 1995, ApJ, 440, 227. Optical absorption of associated neutral carbon cloud.

Milne 1995, MNRAS, 277, 1435. Parkes 64-m at 8.4 GHz (3′), including polarisation, of Vela X.

Danks & Sembach 1995, AJ, 109, 2627. Optical spectroscopy of background stars.

Blair *et al.* 1995, AJ, 110, 312. UV spectroscopy.

Duncan *et al.* 1996, MNRAS, 280, 252. Parkes 64-m at 2.4 GHz (8.′9).

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×62″) of part.

Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.

Frail *et al.* 1997, ApJ, 475, 224. VLA at 330 MHz (1′×1.′8) and comparison with ROSAT observations of Vela X.

Markwardt & Ögelman 1997, ApJ, 480, L13. ASCA observations of pulsar 'jet'.

Raymond *et al.* 1997, ApJ, 482, 881. UV spectroscopy.

Yoshikoshi *et al.* 1997, ApJ, 487, L65. γ-ray observations of pulsar.

Jenkins *et al.* 1998, ApJ, 492, L147. UV absorption to background star.

Dubner *et al.* 1998, AJ, 116, 813. Parkes 64-m at 1.4 GHz (15′) for HI studies.

Bock *et al.* 1998, AJ, 116, 1886. MOST at 843 MHz (43″×60″).

Cha *et al.* 1999, ApJ, 515, L25. Optical spectra, for distance.

Lu & Aschenbach 2000, A&A, 362, 1083. ROSAT spatially resolved spectroscopy.

Chadwick *et al.* 2000, ApJ, 537, 414. Limit on high energy γ-rays from pulsar.

Sankrit *et al.* 2001, ApJ, 549, 416. Far-UV observations of selected region.

Pavlov *et al.* 2001, ApJ, 554, L189. Chandra two epoch observations of pulsar nebula.

Helfand *et al.* 2001, ApJ, 556, 380. Chandra observations of pulsar and its nebula.

Miyata *et al.* 2001, ApJ, 559, L45. Chandra of X-ray extension.

Alvarez *et al.* 2001, A&A, 372, 636. Radio spectral index studies.

*see also:* Alvarez *et al.* 2001, A&A, 379, 323. Erratum.

Caraveo *et al.* 2001, ApJ, 561, 930. HST parallax observations of pulsar.

Moriguchi *et al.* 2001, PASJ, 53, 1025. CO observations.

Dodson *et al.* 2003, MNRAS, 343, 116. ATCA at 1.4, 2.4, 5.2 and 8.5 GHz (6.″2×8.″1, 26″×36″, 12.″1×10.″5 and 11.″2×10.″6) of pulsar nebula.

Sankrit *et al.* 2003, ApJ, 589, 242. Optical nebulosity to NE of G266.2–1.2.

Nichols & Slavin 2004, ApJ, 610, 285. UV absorption toward background sources.

Hales *et al.* 2004, ApJ, 613, 977. Vela X at 31 GHz (4.′1).

Mongano *et al.* 2005, A&A, 436, 917. XMM and other X-ray observations of pulsar nebula.

Miceli *et al.* 2005, A&A, 442, 513. XMM observations of N rim.

Katsuda & Tsunemi 2005, PASJ, 57, 621. XMM observations of E.

Aharonian *et al.* 2006, A&A, 448, L43. γ-ray observations.

McConnell *et al.* 2006, AJ, 131, 648. ATCA at 4.9 GHz (12′) including polarisation.

Katsuda & Tsunemi 2006, ApJ, 642, 917. XMM observations of NE.

Nishikida *et al.* 2006, ApJ, 644, L171. Far UV observations.

Miceli *et al.* 2008, ApJ, 676, 1064. XMM observations.

LaMassa *et al.* 2008, ApJ, 689, L121. XMM observations of Vela X.

Grondin *et al.* 2013, ApJ, 774, 110. Fermi observations of Vela X.

## G266.2–1.2 RX J0852.0–4622

**RA:** $08^h52^m00^s$ **1-GHz flux/Jy:** 50? **Size/arcmin:** 120
**Dec:** –46°20′ **Spectral index:** 0.3? **Type:** S

This remnant overlaps the Vela SNR (G263.9–3.3).

**Radio:** Incomplete shell, confused by the Vela SNR.
**Optical:** Nebulosity offset to NE.
**X-ray:** Non-thermal shell, confused by the Vela SNR, with central source, and possible associated pulsar.
**Point sources:** Central X-ray source, with optical nebula, and possible associated pulsar.
**Distance:** X-ray data suggest an upper limit of 1 kpc.

**References:**


Aschenbach 1998, Nature, 396, 141. ROSAT identification.
Iyudin *et al.* 1998, Nature, 396, 142. γ-ray observations.
Combi *et al.* 1999, ApJ, 519, L177. Radio observations.
Duncan & Green 2000, A&A, 364, 732. Parkes 64-m at 1.4 GHz (14′.0), and comparison with other observations.
Redman *et al.* 2000, ApJ, 543, L153. Optical of nearly nebulosity.
Tsunemi *et al.* 2000, PASJ, 52, 887. ASCA spectral observations.
Slane *et al.* 2001, ApJ, 548, 814. ASCA observations.
Mereghetti *et al.* 2001, ApJ, 548, L213. BeppoSAX observations of central sources.
Pavlov *et al.* 2001, ApJ, 559, L131. Chandra of central X-ray source.
Moriguchi *et al.* 2001, PASJ, 53, 1025. CO observations.
Pellizzoni *et al.* 2002, A&A, 393, L65. Optical observations of central source.
Redman *et al.* 2002, MNRAS, 336, 1093. Optical nebulosity to NE.
Kargaltsev *et al.* 2002, ApJ, 580, 1060. Chandra observations of central source.
Sankrit *et al.* 2003, ApJ, 589, 242. Optical nebulosity to NE.
Redman & Meaburn 2005, MNRAS, 356, 969. Possible pulsar association.
Iyudin *et al.* 2005, A&A, 429, 225. XMM observations.
Aharonian *et al.* 2005, A&A, 437, L7. γ-ray observations.
Katagiri *et al.* 2005, ApJ, 619, L163. γ-ray observations.
Bamba *et al.* 2005, ApJ, 632, 294. Chandra of NW rim.
Reynoso *et al.* 2006, A&A, 449, 243. ATCA at 1.38 GHz (32″×37″).
Enomoto *et al.* 2006, ApJ, 652, 1268. γ-ray observations.
Mignani *et al.* 2007, A&A, 473, 883. Deep optical observations of compact X-ray source.
Aharonian *et al.* 2007, ApJ, 661, 236. γ-ray observations.
Katsuda *et al.* 2008, ApJ, 678, L35. XMM proper motion study.


## G272.2–3.2

**RA:** $09^h06^m50^s$ **1-GHz flux/Jy:** 0.4 **Size/arcmin:** 15?
**Dec:** –52°07′ **Spectral index:** 0.6 **Type:** S?

**Radio:** Diffuse shell.
**Optical:** Detected.
**X-ray:** Centrally brightened.

**References:**


Greiner *et al.* 1994, A&A, 286, L35. ROSAT observations, plus optical observations.
Duncan *et al.* 1997, MNRAS, 289, 97. Parkes 64-m at 1.4 GHz (18′ : $S = 0.38\pm0.09$ Jy) 2.4 GHz (10′.6 : $S = 0.25\pm0.04$ Jy) and 4.8 GHz (5′.7 : $S = 0.17\pm0.02$ Jy), MOST at 843 MHz (45″×70″ : $S = 0.45\pm0.10$ Jy), and ATCA at 2.4 GHz (37″×52″), plus ROSAT observations.
Harrus *et al.* 2001, ApJ, 552, 614. ASCA and ROSAT observations, plus review of earlier observations.


## G279.0+1.1

**RA:** $09^h57^m40^s$ **1-GHz flux/Jy:** 30? **Size/arcmin:** 95
**Dec:** –53°15′ **Spectral index:** 0.6? **Type:** S

**Radio:** Faint, incomplete shell.
**Optical:** Detected.
**Point sources:** Pulsar nearby.

**References:**


Woermann & Jonas 1988, MNRAS, 234, 971. Hartesbeesthoek 26-m at 1.6 (30′ : $S = 25.2\pm4$ Jy) and 2.3 GHz (20′ : $S = 20.7\pm3$ Jy).
Duncan *et al.* 1995, MNRAS, 277, 319. Parkes 64-m at 1.4 (18′ : $S = 28\pm3$ Jy) and 2.4 GHz (11′ : $S = 20\pm2$ Jy), including polarisation.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×53″) of part.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G284.3–1.8 MSH 10–53

**RA:** $10^h18^m15^s$ **1-GHz flux/Jy:** 11? **Size/arcmin:** 24?
**Dec:** –59°00′ **Spectral index:** 0.3? **Type:** S

Has been called G284.2–1.8.

**Radio:** Incomplete, poorly defined shell.
**Point sources:** Pulsar with wind nebula nearby.

**References:**

Ruiz & May 1986, ApJ, 309, 667. CO and optical observations.
Milne *et al.* 1989, PASA, 8, 187. MOST at 843 MHz (43″×50″) and Parkes 64-m at 8.4 GHz (3′ : $S = 5.4\pm0.8$ Jy) including polarisation, plus earlier flux densities.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.
Camilo *et al.* 2001, ApJ, 557, L51. Observations of nearby pulsar.
Camilo *et al.* 2004, ApJ, 616, 1118. Chandra observations of pulsar and nebula.
Abramowski *et al.* 2012, A&A, 541, A5. γ-ray observations.

## G286.5–1.2

**RA:** $10^h35^m40^s$ **1-GHz flux/Jy:** 1.4? **Size/arcmin:** 26×6
**Dec:** –59°42′ **Spectral index:** ? **Type:** S?

**Radio:** Double, elongated arc.
**Optical:** Detected.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S = 1.6$ Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G289.7–0.3

**RA:** $11^h01^m15^s$ **1-GHz flux/Jy:** 6.2 **Size/arcmin:** 18×14
**Dec:** –60°18′ **Spectral index:** 0.2? **Type:** S

**Radio:** Incomplete shell.
**Point sources:** Compact radio source near centre.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S = 6.4\pm0.5$ Jy), plus Parkes 64-m at 4.5 GHz ($S = 7.5\pm2.5$ Jy) and 8.55 GHz ($S = 3.6\pm0.9$ Jy).

## G290.1−0.8 MSH 11–61A

**RA:** $11^h03^m05^s$ **1-GHz flux/Jy:** 42 **Size/arcmin:** 19×14
**Dec:** –60°56′ **Spectral index:** 0.4 **Type:** S

**Radio:** Elongated, clumpy shell.
**Optical:** Filaments detected.
**X-ray:** Centrally brightened.
**Point sources:** Pulsar nearby.
**Distance:** HI absorption indicates 7±1 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4.′4 : $S$ = 20.2 Jy).
Elliott & Malin 1979, MNRAS, 186, 45P. Optical image and spectra.
Kirshner & Winkler 1979, ApJ, 227, 853. Optical observations.
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×50″).
Milne *et al.* 1989, PASA, 8, 187. MOST at 843 MHz (43″×49″ : $S$ = 45±11 Jy), and Parkes 64-m at 8.4 GHz (3′ : $S$ = 19.5±1.0 Jy), including polarisation.
Seward 1990, ApJS, 73, 781. Einstein observations.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×49″ : $S$ = 43 Jy).
Rosado *et al.* 1996, A&A, 315, 243. Optical kinematics.
Kaspi *et al.* 1997, ApJ, 485, 820. Pulsar detection.
Gotthelf & Kaspi 1998, ApJ, 497, L29. ASCA observations of pulsar.
Slane *et al.* 2002, ApJ, 564, 284. ASCA observations.
Filipović *et al.* 2005, SerAJ, 170, 47. ATCA at 1.4 GHz (21″), plus other observations, including CO of surroundings.
Reynoso *et al.* 2006, MNRAS, 369, 416. ATCA at 1.4 GHz (22.″5×25.″0) including HI.


## G291.0−0.1 (MSH 11–62)

**RA:** $11^h11^m54^s$ **1-GHz flux/Jy:** 16 **Size/arcmin:** 15×13
**Dec:** –60°38′ **Spectral index:** 0.29 **Type:** C

**Radio:** Centrally brightened core, with surrounding arcs.
**Optical:** Detected.
**X-ray:** Centrally brightened.
**Point sources:** Central compact X-ray source.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Roger *et al.* 1986, MNRAS, 219, 815. MOST at 843 MHz (43″×50″ : $S$ = 17.2±1.0 Jy), and Parkes 64-m at 5 and 8.4 GHz (4.′6 and 3′ : $S$ = 10.4±0.4 Jy and 9.′1±0.2), with polarisation.
Wilson 1986, ApJ, 302, 718. Einstein observations.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×49″ : $S$ = 12.7 Jy).
Harrus *et al.* 1998, ApJ, 499, 273. ASCA observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.
Slane *et al.* 2012, ApJ, 749, 131. Chandra, XMM and Fermi observations.

## G292.0+1.8 MSH 11–54

**RA:** $11^h24^m36^s$ **1-GHz flux/Jy:** 15 **Size/arcmin:** 12×8
**Dec:** –59°16′ **Spectral index:** 0.4 **Type:** C

**Radio:** Centrally brightened source surrounded by a plateau of faint emission.
**Optical:** Oxygen rich.
**X-ray:** Ring of emission, with diffuse central nebula and pulsar.
**Point sources:** Central pulsar.
**Distance:** HI absorption implies 6.0 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Lockhart *et al.* 1977, MNRAS, 179, 147. Fleurs at 1415 MHz (50″ : $S$ = 13.0 Jy).
Goss *et al.* 1979, MNRAS, 188, 357. Optical spectra.
Clark *et al.* 1980, MNRAS, 193, 129. X-ray spectrum.
Tuohy *et al.* 1982, ApJ, 260, L65. Einstein observations.
Dopita & Tuohy 1984, ApJ, 282, 135. Optical spectra.
Braun *et al.* 1986, A&A, 162, 259. MOST at 843 MHz (0′.8) and IRAS.
Hughes & Singh 1994, ApJ, 422, 126. EXOSAT spectrum.
Sutherland & Dopita 1995, ApJ, 439, 365. Spectrophotometry.
Hughes *et al.* 2001, ApJ, 559, L153. Chandra observations, including central nebula.
Camilo *et al.* 2002, ApJ, 567, L71. Pulsar detection.
Park *et al.* 2002, ApJ, 564, L39. Chandra observations.
Gonzalez & Safi-Harb 2003, ApJ, 583, L91. Chandra observations.
Hughes *et al.* 2003, ApJ, 591, L139. Chandra observations of pulsar.
Gaensler & Wallace 2003, ApJ, 594, 326. ATCA at 1.4, 2.3 and 5.2 GHz (9″.6×8″.0, 7″.2×6″.2 and 5″.5×4″.8 : $S$ = 11.9±0.1, 11.4±0.1 and 8.8±0.1), plus HI observations.
Park *et al.* 2004, ApJ, 602, L33. Chandra observations.
Vink *et al.* 2004, NuPhS, 132, 62. XMM observations.
Ghavamian *et al.* 2005, ApJ, 635, 365. Optical imaging spectroscopy.
Winkler & Long 2006, AJ, 132, 360. Optical observations.
Park *et al.* 2007, ApJ, 670, L121. Chandra observations.
Zharikov *et al.* 2008, A&A, 492, 805. Possible optical counterpart to pulsar and nebula.
Winkler *et al.* 2009, ApJ, 692, 1489. Optical proper motion studies.
Ghavamian *et al.* 2009, ApJ, 696, 1307. Spitzer spectroscopy.
Lee *et al.* 2009, ApJ, 706, 441. IR observations.
Lee *et al.* 2010, ApJ, 711, 861. Chandra observations.
Ghavamian *et al.* 2012, ApJ, 750, 39. Spitzer observations
Zharikov *et al.* 2013, A&A, 554, A120. IR of pulsar wind nebula.


## G292.2–0.5

**RA:** $11^h19^m20^s$ **1-GHz flux/Jy:** 7 **Size/arcmin:** 20×15
**Dec:** –61°28′ **Spectral index:** 0.5 **Type:** S

**Radio:** Shell.
**X-ray:** Shell, brighter to W, with central nebula.
**Point sources:** Central, young pulsar.
**Distance:** HI absorption indicates 8.4 kpc.

**References:**


Camilo *et al.* 2000, ApJ, 541, 367. Pulsar detection.
Crawford *et al.* 2001, ApJ, 554, 152. ATCA at 1.4 GHz (29″×25″ : $S$ = 5.6×0.3 Jy) and 2.5 GHz (21″×20″).
Pivovaroff *et al.* 2001, ApJ, 554, 161. ROSAT and ASCA observations.
Gonzalez & Safi-Harb 2003, ApJ, 591, L143. Chandra observations of pulsar.
Caswell *et al.* 2004, MNRAS, 352, 1405. ATCA at 5 GHz (1′ : $S$ = 2.8 Jy), including polarisation, and 1.4 GHz for HI absorption.
Gonzalez & Safi-Harb 2005, ApJ, 619, 856. Chandra observations.
Gonzalez *et al.* 2005, ApJ, 630, 489. XMM observations of pulsar.
Safi-Harb *et al.* 2008, ApJ, 684, 532. Chandra observations of pulsar and nebula.
Kumar *et al.* 2012, ApJ, 754, 96. Chandra and XMM observations.
Ng *et al.* 2012, ApJ, 761, 65. XMM observations.


## G293.8+0.6

**RA:** $11^h35^m00^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 20
**Dec:** –60°54′ **Spectral index:** 0.6? **Type:** C

**Radio:** Central source, with faint extended plateau.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 9.0 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 2.1 Jy).
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×51″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×49″ : $S$ = 2.6 Jy).

## G294.1−0.0

**RA:** $11^h36^m10^s$ **1-GHz flux/Jy:** >2? **Size/arcmin:** 40
**Dec:** –61°38′ **Spectral index:** ? **Type:** S

**Radio:** Faint shell.

**References:**
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×49″ : $S>2$).

## G296.1−0.5

**RA:** $11^h51^m10^s$ **1-GHz flux/Jy:** 8? **Size/arcmin:** 37×25
**Dec:** –62°34′ **Spectral index:** 0.6? **Type:** S

Incorporates the previously catalogued remnant G296.1–0.7. Has been called G296.05–0.50.

**Radio:** Irregular shell, with nearby HII regions.
**Optical:** Detected.
**X-ray:** Irregular, incomplete shell.

**References:**
Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 6.9 Jy) and Parkes 64-m at 5 GHz (4′ : $S>0.74$).
Longmore *et al.* 1977, MNRAS, 181, 541. Optical spectra.
van den Bergh 1978, ApJS, 38, 119. Optical observations.
Markert *et al.* 1981, ApJ, 248, L17. Einstein observations.
Caswell & Barnes 1983, ApJ, 271, L55. Molonglo at 408 MHz (3′ : $S$ = 12.4 Jy).
Bignami *et al.* 1986, ApJ, 302, 606. EXOSAT and Einstein observations.
Hwang & Markert 1994, ApJ, 431, 819. ROSAT observations.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″ : $S>2.4$).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Castro *et al.* 2011, ApJ, 734, 86. XMM observations.
Gök & Sezer 2012, MNRAS, 419, 1603. Suzaku observations.

## G296.5+10.0 PKS 1209–51/52

**RA:** $12^h09^m40^s$ **1-GHz flux/Jy:** 48 **Size/arcmin:** 90×65
**Dec:** –52°25′ **Spectral index:** 0.5 **Type:** S

Has been called G296.5+9.7.

**Radio:** Shell with two bright limbs.
**Optical:** Detected.
**X-ray:** Incomplete shell, with central pulsar.
**Point sources:** Central pulsar.

**References:**
Irvine & Irvine 1974, ApJ, 192, L111. Optical observations.
Danziger & Dennefeld 1976, PASP, 88, 44. Optical spectra.
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
Tuohy *et al.* 1979, ApJ, 230, L27. X-ray detection with HEAO-1 A2 experiment.
Ruiz 1983, AJ, 88, 1210. Optical spectra.
Dubner *et al.* 1986, AJ, 91, 343. Argentine 30-m dish at 1.4 GHz (34′), plus HI.
Kellett *et al.* 1987, MNRAS, 225, 199. EXOSAT of the west of the remnant, including the compact source.
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×56″).
Matsui *et al.* 1988, ApJ, 329, 838. Einstein observations, including compact source.
Roger *et al.* 1988, ApJ, 332, 940. MOST at 843 MHz (44″×56″).
Bignami *et al.* 1992, ApJ, 389, L67. Optical in vicinity of X-ray source.
Milne & Haynes 1994, MNRAS, 270, 106. Parkes 64-m at 2.4 GHz (8′.3 : $S$ = 33±3 Jy), 4.8 GHz (4′.5 : $S$ = 23.3±3 Jy) and 8.4 GHz (3′.0 : 18.8±3), including polarisation and review of flux densities.
Mereghetti *et al.* 1996, ApJ, 464, 842. Radio, optical and X-ray observations of central source.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.
Vasisht *et al.* 1997, ApJ, 476, L43. ASCA observations of neutron star.
Zavlin *et al.* 1998, A&A, 331, 821. ROSAT and ASCA observations of neutron star.
Giacani *et al.* 2000, AJ, 119, 281. ATCA at 1.4 GHz (2′.7×4′.0) for HI studies.
Zavlin *et al.* 2000, ApJ, 540, L25. Chandra observations of central pulsar.
Gotthelf & Halpern 2007, ApJ, 664, L35. X-ray timing observations of pulsar.
Harvey-Smith *et al.* 2010, ApJ, 712, 1157. ATCA at 1.4 GHz (1′.8×3′.3), including polarisation.
Araya *et al.* 2013, MNRAS, 434, 2202. Fermi observations.

## G296.7–0.9

**RA:** $11^h55^m30^s$ **1-GHz flux/Jy:** 3 **Size/arcmin:** 15×8
**Dec:** –63°08′ **Spectral index:** 0.5 **Type:** S

**Radio:** Bilateral shell.

**X-ray:** Brighter to SE.

**References:**

Schaudel *et al.* 2002, ASPC, 271, 391. ROSAT observations.
Robbins *et al.* 2012, MNRAS, 419, 2623. ATCA at 1.4 GHz (33″×45″ : $S$ = 2.5±0.2 Jy), plus MOST at 843 MHz (43″×49″), plus other observations.
Prinz & Becker 2013, A&A, 550, A33. XMM observations.

## G296.8–0.3 1156–62

**RA:** $11^h58^m30^s$ **1-GHz flux/Jy:** 9 **Size/arcmin:** 20×14
**Dec:** –62°35′ **Spectral index:** 0.6 **Type:** S

**Radio:** Shell, brighter to the NW.

**X-ray:** Detected.

**Distance:** HI absorption gives 9.6 kpc.

**References:**

Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S$=15.0 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=3.2 Jy).
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8.′4) and 5 GHz (4.′4).
Hwang & Markert 1994, ApJ, 431, 819. ROSAT observations.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″ : $S$=9.2 Jy).
Gaensler *et al.* 1998, MNRAS, 296, 813. ATCA at 1.3 GHz (22″×24″ : $S$ = 7.0±0.3 Jy), including polarisation and HI observations, plus review of flux densities.
Sánchez-Ayaso *et al.* 2012, Ap&SS, 337, 573. XMM and IR observations.

## G298.5–0.3

**RA:** $12^h12^m40^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 5?
**Dec:** –62°52′ **Spectral index:** 0.4? **Type:** ?

**Radio:** Not well resolved, may be part of a larger ring?

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Hwang & Markert 1994, ApJ, 431, 819. ROSAT upper limit.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″ : $S$=1.8 Jy).
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

## G298.6–0.0

**RA:** $12^h13^m41^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 12×9
**Dec:** –62°37′ **Spectral index:** 0.3 **Type:** S

Has been called G298.6–0.1.

**Radio:** Incomplete shell, in complex region.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×50″).
Hwang & Markert 1994, ApJ, 431, 819. ROSAT upper limit.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″ : $S$=7.4 Jy).
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

## G299.2−2.9

**RA:** $12^h15^m13^s$ **1-GHz flux/Jy:** 0.5? **Size/arcmin:** 18×11
**Dec:** −65°30′ **Spectral index:** ? **Type:** S

**Radio:** Faint source.
**Optical:** Filaments in W.
**X-ray:** Centrally brightened with shell at higher energies.

**References:**
Busser *et al.* 1996, A&A, 310, L1. ROSAT detection, plus optical studies.
Slane *et al.* 1996, ApJ, 465, 840. Einstein, IRAS and radio observations.
Bai & Wang 2000, ApJ, 539, 760. ASCA observations.
Park *et al.* 2007, ApJ, 665, 1173. Chandra observations.

## G299.6−0.5

**RA:** $12^h21^m45^s$ **1-GHz flux/Jy:** 1.0? **Size/arcmin:** 13
**Dec:** −63°09′ **Spectral index:** ? **Type:** S

**Radio:** Faint shell, brightest to E.

**References:**
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″ : $S$ = 1.1 Jy).

## G301.4−1.0

**RA:** $12^h37^m55^s$ **1-GHz flux/Jy:** 2.1? **Size/arcmin:** 37×23
**Dec:** −63°49′ **Spectral index:** ? **Type:** S

**Radio:** Faint, incomplete shell, with possible extension to southwest.

**References:**
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″ : $S$ = 2.3 Jy).

## G302.3+0.7

**RA:** $12^h45^m55^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 17
**Dec:** −62°08′ **Spectral index:** 0.4? **Type:** S

**Radio:** Distorted shell, in complex region, with possibly associated filament.

**References:**
Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 7.5 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 3.0 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×49″ : $S$ = 3.2 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.

## G304.6+0.1 Kes 17

**RA:** $13^h05^m59^s$ **1-GHz flux/Jy:** 14 **Size/arcmin:** 8
**Dec:** –62°42′ **Spectral index:** 0.5 **Type:** S

**Radio:** Incomplete shell.
**X-ray:** Detected.
**Distance:** Possible limit of > 9.7 kpc from HI absorption.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4.′4 : $S$ = 6.9 Jy).
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″ : $S$ = 18 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Hewitt *et al.* 2009, ApJ, 694, 1266. Spitzer spectroscopy.
Combi *et al.* 2010, A&A, 523, A76. XMM observations
Lee *et al.* 2011, ApJ, 740, 31. AKARI and Spitzer observations.
Wu *et al.* 2011, ApJ, 740, L12. Fermi observations.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.
Gök & Sezer 2012, MNRAS, 423, 1215. Suzaku observations.
Gelfand *et al.* 2013, ApJ, 777, 148. ATCA at 1.4 GHz (8″×23″ : $S$ = 10.9±0.4 Jy), plus other observations.


## G306.3–0.9

**RA:** $13^h21^m50^s$ **1-GHz flux/Jy:** 0.16? **Size/arcmin:** 4
**Dec:** –63°34′ **Spectral index:** 0.5? **Type:** S?

**Radio:** Diffuse emission.
**X-ray:** Partial shell.

**References:**


Reynolds *et al.* 2013, ApJ, 766, 112. Chandra observations, and ATCA at 5.5 GHz (23″×26″), and 9 GHz.


## G308.1–0.7

**RA:** $13^h37^m37^s$ **1-GHz flux/Jy:** 1.2? **Size/arcmin:** 13
**Dec:** –63°04′ **Spectral index:** ? **Type:** S

**Radio:** Faint shell.

**References:**


Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″ : $S$ = 1.3 Jy).


## G308.4–1.4

**RA:** $13^h41^m30^s$ **1-GHz flux/Jy:** 0.4? **Size/arcmin:** 12×6?
**Dec:** –63°44′ **Spectral index:** ? **Type:** S?

W part has been called G308.3–1.4.

**Radio:** Complex structure, with multiple arcs.
**X-ray:** Limb brightened partial shell in W.

**References:**


Schaudel *et al.* 2002, ASPC, 271, 391. ROSAT observations.
Prinz & Becker 2012, A&A, 544, A7. ATCA at 1.4 GHz (53″×64″ : $S$ = 0.33 Jy) and 2.5 GHz (29″×35″ : $S$ = 0.24 Jy), plus Chandra and other observations.
Hui *et al.* 2012, ApJ, 750, 7. XMM and other observations.
De Horta *et al.* 2013, MNRAS, 428, 1980. ATCA at 1.4 GHz (54″×65″) and 2.5 GHz (29″×35″), plus other observations.

## G308.8–0.1

**RA:** $13^h42^m30^s$ **1-GHz flux/Jy:** 15? **Size/arcmin:** 30×20?
**Dec:** –62°23′ **Spectral index:** 0.4? **Type:** C?

Incorporates previous catalogued remnant G308.7+0.0.

**Radio:** Bright ridge in north, and arc to south.

**Point sources:** Pulsar near centre of remnant.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$ : $S$ = 16.7 Jy) and Parkes 64-m at 5 GHz ($4'$ : $S$ = 7.0 Jy).
Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz ($4\farcm4$ : $S$ = 6.5 Jy).
Caswell *et al.* 1981, MNRAS, 195, 89. FIRST at 1415 MHz ($50''$).
Wilson 1986, ApJ, 302, 718. Lack of detection with Einstein.
Caswell *et al.* 1992, ApJ, 399, L151. MOST at 843 MHz ($43''\times49''$).
Kaspi *et al.* 1992, ApJ, 399, L155. Pulsar observations.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.


## G309.2–0.6

**RA:** $13^h46^m31^s$ **1-GHz flux/Jy:** 7? **Size/arcmin:** 15×12
**Dec:** –62°54′ **Spectral index:** 0.4? **Type:** S

Has been called G309.2–0.7.

**Radio:** Distorted shell.

**X-ray:** Extended emission, with unrelated central source.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$ : $S$ = 10.0 Jy) and Parkes 64-m at 5 GHz ($4'$ : $S$ = 3.9 Jy).
Caswell *et al.* 1981, MNRAS, 195, 89. FIRST at 1415 MHz ($1\farcm5$).
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz ($44''\times50''$).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times48''$ : $S$ = 6 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Gaensler *et al.* 1998, MNRAS, 299, 812. ATCA at 1.3 GHz ($24''\times23''$ : $S$ = 5.2±0.2 Jy).
Rakowski *et al.* 2001, ApJ, 548, 258. ASCA and ROSAT observations.
Rakowski *et al.* 2006, ApJ, 649, L111. Observations of central source.
Safi-Harb *et al.* 2007, ApJ, 659, 407. Observations of central source.


## G309.8+0.0

**RA:** $13^h50^m30^s$ **1-GHz flux/Jy:** 17 **Size/arcmin:** 25×19
**Dec:** –62°05′ **Spectral index:** 0.5 **Type:** S

**Radio:** Distorted shell.

**Point sources:** Steep radio spectrum source near the centre of the remnant.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$ : $S$ = 26.4 Jy) and Parkes 64-m at 5 GHz ($4'$ : $S$ = 7.4 Jy).
Caswell *et al.* 1980, MNRAS, 190, 881. FIRST at 1415 MHz ($1'$).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times49''$ : $S > 8.8$).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.


## G310.6–1.6

**RA:** $14^h00^m45^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 2.5
**Dec:** –63°26′ **Spectral index:** ? **Type:** C?

**X-ray:** Bright central nebula, with faint shell.

**Point sources:** X-ray pulsar.

**References:**


Renaud *et al.* 2010, ApJ, 716, 663. Chandra and other observations.

## G310.6−0.3 Kes 20B

**RA:** $13^h58^m00^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 8
**Dec:** $-62°09'$ **Spectral index:** ? **Type:** S

**Radio:** Asymmetric shell.

**References:**
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times49'':S=5.4$ Jy).
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

## G310.8−0.4 Kes 20A

**RA:** $14^h00^m00^s$ **1-GHz flux/Jy:** 6? **Size/arcmin:** 12
**Dec:** $-62°17'$ **Spectral index:** ? **Type:** S

**Radio:** Arc in E, in complex region.

**References:**
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times49'':S=6.9$ Jy).
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.

## G311.5−0.3

**RA:** $14^h05^m38^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 5
**Dec:** $-61°58'$ **Spectral index:** 0.5 **Type:** S

**Radio:** Shell, not well resolved.

**References:**
Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz ($3'$) and Parkes 64-m at 5 GHz ($4'$).
Caswell & Barnes 1985, MNRAS, 216, 753. Molonglo at 408 MHz ($3'$).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times49'':S=2.9$ Jy).
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.

## G312.4−0.4

**RA:** $14^h13^m00^s$ **1-GHz flux/Jy:** 45 **Size/arcmin:** 38
**Dec:** $-61°44'$ **Spectral index:** 0.36 **Type:** S

**Radio:** Irregular, incomplete shell.
**X-ray:** Weak emission in W.
**Point sources:** Nearby γ-ray sources and pulsars.
**Distance:** HI absorption suggests $>6$ kpc and possibly $>14$ kpc.

**References:**
Caswell & Barnes 1985, MNRAS, 216, 753. Molonglo at 408 MHz ($3':S=56$ Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times49''$ : $S>19$), plus Parkes 64-m at 4.5 GHz ($S=30\pm2$ Jy) and 8.55 GHz ($S=17\pm4$ Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Case & Bhattacharya 1999, ApJ, 521, 246. Nearby γ-ray sources.
Roberts *et al.* 1999, ApJ, 515, 712. MOST at 843 MHz ($43''\times49''$).
Doherty *et al.* 2003, MNRAS, 339, 1048. ATCA at 1.4 GHz ($25''$) plus HI absorption, and Chandra observations.

## G312.5−3.0

**RA:** $14^h21^m00^s$ **1-GHz flux/Jy:** 3.5? **Size/arcmin:** 20×18
**Dec:** $-64°12'$ **Spectral index:** ? **Type:** S

**Radio:** Distorted shell.

**References:**
Duncan *et al.* 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz ($10'.4$)
Kane & Vaughan 2003, MNRAS, 344, 625. ATCA at 1.4 GHz ($129''\times116''$) and 2.4 GHz ($75''\times67''$).

## G315.1+2.7

**RA:** $14^h24^m30^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 190×150
**Dec:** –57°50′ **Spectral index:** ? **Type:** S

**Radio:** Poorly defined shell.
**Optical:** Filaments, brighter in NE.

**References:**


Duncan *et al.* 1997, MNRAS, 287, 722. Parkes 64-m at 2.4 GHz (11′:$S$=19±3 Jy).
Combi *et al.* 1998, A&A, 333, 298. Radio survey observations.
Stupar *et al.* 2007, MNRAS, 374, 1441. Optical and various radio observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.


## G315.4–2.3 RCW 86, MSH 14–63

**RA:** $14^h43^m00^s$ **1-GHz flux/Jy:** 49 **Size/arcmin:** 42
**Dec:** –62°30′ **Spectral index:** 0.6 **Type:** S

Possibly the remnant of the SN of AD185?
**Radio:** Shell, brightest to the SW.
**Optical:** Bright, radiative filaments, with some faint Balmer dominated filaments.
**X-ray:** Partial shell, with thermal and non-thermal emission.
**Point sources:** Several X-ray sources.
**Distance:** Optical observations imply 2.3 kpc.

**References:**


van den Bergh *et al.* 1973, ApJS, 26, 19. Optical observations.
Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′:$S$=86 Jy) and Parkes 64-m at 5 GHz (4′:$S$=18.2 Jy).
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8.′4) and 5 GHz (4.′4).
Winkler 1978, ApJ, 221, 220. X-ray detection.
Leibowitz & Danziger 1983, MNRAS, 204, 273. Optical spectra.
Pisarski *et al.* 1984, ApJ, 277, 710. Einstein observations
Nugent *et al.* 1984, ApJ, 284, 612. X-ray spectrum.
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×50″).
Long & Blair 1990, ApJ, 358, L13. Balmer dominated optical filaments.
Greidanus & Strom 1990, A&A, 240, 385. IRAS observations.
Kaastra *et al.* 1992, A&A, 264, 654. Ginga X-ray spectra.
Strom 1994, MNRAS, 268, L5. Historical association
Chin & Huang 1994, Nature, 371, 398. Questioning of historical association.
Schaefer 1995, AJ, 110, 1793. Questioning of historical association.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×48″:$S>22$).
Rosado *et al.* 1996, A&A, 315, 243. Optical kinematics.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Smith *et al.* 1997, AJ, 114, 2664. Observations of Balmer dominated filaments.
Vink *et al.* 1997, A&A, 328, 628. ASCA spectroscopy.
Bocchino *et al.* 2000, A&A, 360, 671. BeppoSAX observations of N and SW.
Bamba *et al.* 2000, PASJ, 52, 1157. ASCA observations.
Ghavamian *et al.* 2001, ApJ, 547, 995. Optical spectroscopy.
Dickel *et al.* 2001, ApJ, 546, 447. ATCA at 1.34 GHz (8″), including polarisation.
Borkowski *et al.* 2001, ApJ, 550, 334. ASCA observations.
Rho *et al.* 2002, ApJ, 581, 1116. Chandra observations.
Gvaramadze & Vikhlinin 2003, A&A, 401, 625. Chandra point source search.
Sollerman *et al.* 2003, A&A, 407, 249. Optical spectroscopy.
Kaplan *et al.* 2004, ApJS, 153, 269. Chandra limits for any compact source.
Bamba *et al.* 2005, ApJ, 621, 793. Chandra observations of rim.
Vink *et al.* 2006, ApJ, 648, L33. Chandra and XMM observations.
Ueno *et al.* 2007, PASJ, 59, S171. Suzaku observations.
Aharonian *et al.* 2009, ApJ, 692, 1500. γ-ray observations.
Yamaguchi *et al.* 2011, PASJ, 63, S837. Suzaku observations.
Helder *et al.* 2011, ApJ, 737, 85. XMM and optical observations.
Williams *et al.* 2011, ApJ, 741, 96. Spitzer observations.
Mignani *et al.* 2012, MNRAS, 425, 2309. X-ray and optical observations of compact X-ray sources.
Lemoine-Goumard *et al.* 2012, A&A, 545, A28. γ-ray observations.
Helder *et al.* 2013, MNRAS, 435, 910. Optical proper motion studies.
Castro *et al.* 2013, ApJ, 779, 49. Chandra of NW.

## G315.4–0.3

**RA:** $14^h35^m55^s$ **1-GHz flux/Jy:** 8 **Size/arcmin:** 24×13
**Dec:** –60°36′ **Spectral index:** 0.4 **Type:** ?

**Radio:** Irregular non-thermal emission, with HII region superposed in E.
**Optical:** Detected.

**References:**

Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 15.9 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 4.9 Jy).
Caswell *et al.* 1981, MNRAS, 195, 89. FIRST at 1415 MHz (50″ : $S$ = 6.25 Jy), re-assessment of earlier flux densities.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×49″ : $S$ = 3.1 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G315.9–0.0

**RA:** $14^h38^m25^s$ **1-GHz flux/Jy:** 0.8? **Size/arcmin:** 25×14
**Dec:** –60°11′ **Spectral index:** ? **Type:** S

Has been called G315.8–0.0.

**Radio:** Faint, distorted shell, with elongated trail to pulsar.
**Point sources:** Pulsar at end of radio trail.

**References:**

Kesteven *et al.* 1987, AuJPh, 40, 855. MOST at 843 MHz (44″×50″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S$ = 0.9 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.
Camilo *et al.* 2009, ApJ, 703, L55. Pulsar detection.
Ng *et al.* 2012, ApJ, 746, 105. ATCA at 1.4, 2.5, 5 and 9 GHz, including polarisation, of pulsar trail.

## G316.3–0.0 (MSH 14–57)

**RA:** $14^h41^m30^s$ **1-GHz flux/Jy:** 20? **Size/arcmin:** 29×14
**Dec:** –60°00′ **Spectral index:** 0.4 **Type:** S

**Radio:** Distorted shell, with possible ‘blowout’.
**X-ray:** Detected.
**Distance:** HI absorption data suggests $> 7.2$ kpc.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4.′4 : $S$ = 16.7 Jy).
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×51″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S$ = 20 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.

## G317.3–0.2

**RA:** $14^h49^m40^s$ **1-GHz flux/Jy:** 4.7? **Size/arcmin:** 11
**Dec:** –59°46′ **Spectral index:** ? **Type:** S

**Radio:** Incomplete shell.
**Optical:** Detected.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S$ = 5.2 Jy).
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G318.2+0.1

**RA:** $14^h54^m50^s$ **1-GHz flux/Jy:** >3.9? **Size/arcmin:** 40×35
**Dec:** –59°04′ **Spectral index:** ? **Type:** S

**Radio:** Faint shell, with central HII region.
**X-ray:** Sources within remnant.

**References:**
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S>4.3$).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Bocchino *et al.* 2001, A&A, 367, 629. BeppoSAX and ROSAT observations.

## G318.9+0.4

**RA:** $14^h58^m30^s$ **1-GHz flux/Jy:** 4? **Size/arcmin:** 30×14
**Dec:** –58°29′ **Spectral index:** 0.2? **Type:** C

May not be a SNR?

**Radio:** Complex arcs, with off-centre core.

**References:**
Whiteoak 1990, Nature, 347, 157. MOST at 843 MHz (43″×51″).
Whiteoak 1993, ApJ, 415, 701. MOST at 843 MHz (43″×51″ : $S=4.8\pm0.6$ Jy), Parkes 64-m at 4.5 GHz (4′.7 : $S=3.7\pm0.2$ Jy) and 8.4 GHz (2′.8 : $S=3.0\pm0.4$ Jy) including polarisation, and ATCA at 1.4 GHz and 4.8 GHz (11″×13″) of core.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S=4.8$ Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G320.4–1.2 MSH 15–52, RCW 89

**RA:** $15^h14^m30^s$ **1-GHz flux/Jy:** 60? **Size/arcmin:** 35
**Dec:** –59°08′ **Spectral index:** 0.4 **Type:** C

Has been suggested as the remnant of the SN of AD185?

**Radio:** Ragged shell.
**Optical:** RCW 89 is the Hα emitting region to the NW.
**X-ray:** Partial shell, central nebula and pulsar and 'jet'.
**Point sources:** Radio and X-ray pulsar, with wind nebula.
**Distance:** HI absorption indicates 5.2 kpc.

**References:**


Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
Dopita *et al.* 1977, ApJ, 214, 179. Optical spectra.
Caswell *et al.* 1981, MNRAS, 195, 89. FIRST at 1415 MHz (50″).
Seward & Harnden 1982, ApJ, 256, L45. X-ray observations of pulsar.
Manchester *et al.* 1982, ApJ, 262, L31. Radio observations of pulsar.
Seward *et al.* 1983, ApJ, 267, 698. X-ray, Optical and IR.
van den Bergh & Kamper 1984, ApJ, 280, L51. Optical expansion.
Seward *et al.* 1984, ApJ, 281, 650. X-ray observations of pulsar and nebulosity.
Lortet *et al.* 1987, A&A, 180, 65. Optical observations.
Trussoni *et al.* 1990, A&A, 234, 403. EXOSAT observations.
Asaoka & Koyama 1990, PASJ, 42, 625. Ginga X-ray spectrum.
Arendt 1991, AJ, 101, 2160. IRAS observations, including compact source.
Milne *et al.* 1993, MNRAS, 264, 853. Parkes 64-m at 4.8 GHz (4′.5 : $S = 37 \pm 7$ Jy) and 8.4 GHz (3′.0 : $S = 24 \pm 4$ Jy), including polarisation and review of flux densities.
Strom 1994, MNRAS, 268, L5. Historical association.
Chin & Huang 1994, Nature, 371, 398. Questioning of historical association.
Matz *et al.* 1994, ApJ, 434, 288. X-ray observations of pulsar.
Schaefer 1995, AJ, 110, 1793. Questioning of historical association.
Du Plessis *et al.* 1995, ApJ, 453, 746. Hartesbeesthoek 26-m at 2.3, 5 and 8.5 GHz ($S = 42, 35.6$ and 14.5 Jy).
Greiveldinger *et al.* 1995, ApJ, 454, 855. ROSAT observations.
Trussoni *et al.* 1996, A&A, 306, 581. ROSAT observations.
Tamura *et al.* 1996, PASJ, 48, L33. ASCA observations.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S = 62$ Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Marsden *et al.* 1997, ApJ, 491, L39. X-ray spectroscopy.
Brazier & Becker 1997, MNRAS, 284, 335. ROSAT observations.
Gaensler *et al.* 1999, MNRAS, 305, 724. ATCA at 1.4 GHz (24″×21″), plus HI observations, and 5.3 GHz (15″×10″).
Sako *et al.* 2000, ApJ, 537, 422. Possible high energy γ-ray detection of pulsar.
Mineo *et al.* 2001, A&A, 380, 695. BeppoSAX observations.
Gaensler *et al.* 2002, ApJ, 569, 878. Chandra observations of pulsar and nebula.
Dubner *et al.* 2002, AJ, 123, 337. ATCA at 1.4 GHz (4′.0×2′.7), plus HI observations.
Aharonian *et al.* 2005, A&A, 435, L17. γ-ray detection.
Yatsu *et al.* 2005, ApJ, 631, 312. Chandra observations of pulsar and jet.
DeLaney *et al.* 2006, ApJ, 640, 929. Chandra and ROSAT multi-epoch observations of pulsar wind nebula.
Kaplan & Moon 2006, ApJ, 644, 1056. Possible IR detection of pulsar.
Forot *et al.* 2006, ApJ, 651, L45. X-ray observations of pulsar and nebula.
Nakamori *et al.* 2008, ApJ, 677, 297. γ-ray observations.
Yatsu *et al.* 2009, PASJ, 61, 129. Chandra observations of pulsar wind nebula.
Koo *et al.* 2011, ApJ, 732, 6. AKARI and Spitzer observations.


## G320.6–1.6

**RA:** $15^h17^m50^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 60×30
**Dec:** –59°16′ **Spectral index:** ? **Type:** S

**Radio:** Faint shell, overlapping G320.4–1.2 in W.
**Optical:** Detected.

**References:**


Milne *et al.* 1993, MNRAS, 264, 853. Parkes 64-m at 4.8 GHz (4′.5) and 8.4 GHz (3′.0), including polarisation.
Duncan *et al.* 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz (10′.4).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×50″ : $S > 9.3$).
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G321.9−1.1

**RA:** $15^h23^m45^s$ **1-GHz flux/Jy:** >3.4? **Size/arcmin:** 28
**Dec:** –58°13′ **Spectral index:** ? **Type:** S

**Radio:** Faint shell.

**References:**
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×51″ : $S > 3.8$).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G321.9−0.3

**RA:** $15^h20^m40^s$ **1-GHz flux/Jy:** 13 **Size/arcmin:** 31×23
**Dec:** –57°34′ **Spectral index:** 0.3 **Type:** S

**Radio:** Shell brighter to the W, with Cir X-1 to N.
**Point sources:** Compact, probably thermal source at S edge.

**References:**
Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 18.3 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 7.8 Jy).
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×52″).
Stewart *et al.* 1993, MNRAS, 261, 593. ATCA at 1.5 GHz (21″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×51″ : $S > 8.3$).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Mignani *et al.* 2002, A&A, 386, 487. HST proper motion study of Cir X-1.
Tudose *et al.* 2006, MNRAS, 372, 417. MOST at 843 MHz.

## G322.1+0.0

**RA:** $15^h20^m49^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 8×4.5?
**Dec:** –57°10′ **Spectral index:** ? **Type:** S?

**Radio:** Circular shell, with extension to S.
**X-ray:** Diffuse emission.
**Point sources:** Cir X-1 HMXB at centre.

**References:**
Heinz *et al.* 2013, ApJ, 779, 171. Chandra observations and ATCA at 1.1–3.1 GHz (4.″0×4.″9).

## G322.5−0.1

**RA:** $15^h23^m23^s$ **1-GHz flux/Jy:** 1.5 **Size/arcmin:** 15
**Dec:** –57°06′ **Spectral index:** 0.4 **Type:** C

**Radio:** Shell with central extended source.
**Point sources:** PN Pe 2-8 within boundary.

**References:**
Whiteoak 1992, MNRAS, 256, 121. MOST at 843 MHz (43″×51″ : $S$ = 2.0±0.3 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×51″ : $S$ = 1.7 Jy), plus Parkes 64-m at 4.5 GHz (=0.89±0.13).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G323.5+0.1

**RA:** $15^h28^m42^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 13
**Dec:** –56°21′ **Spectral index:** 0.4? **Type:** S

**Radio:** Distorted shell, confused with thermal emission.
**Point sources:** Compact, probably thermal source near centre.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 4.2 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 1.5 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×52″ : $S$ = 4.2 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.


## G326.3–1.8 MSH 15–56

**RA:** $15^h53^m00^s$ **1-GHz flux/Jy:** 145 **Size/arcmin:** 38
**Dec:** –56°10′ **Spectral index:** varies **Type:** C

Has been called G326.2–1.7.

**Radio:** Shell, with elongated, flat-spectrum core.
**Optical:** Emission around the shell.
**X-ray:** Shell, with central extended emission.
**Point sources:** Compact X-ray source.

**References:**


Clark *et al.* 1975, AuJPA, 37, 75. Molonglo at 408 MHz (3′ : $S$ = 180 Jy).
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Milne *et al.* 1979, MNRAS, 188, 437. FIRST at 1415 MHz (0.′8 : $S > 95$) and Parkes 64-m at 14.7 GHz (2.′2 : $S$ = 69±8 Jy).
van den Bergh 1979, ApJ, 227, 497. Optical observations.
Zealey *et al.* 1979, A&AS, 38, 39. Optical observations.
Dennefeld 1980, PASP, 92, 603. Optical spectra.
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×53″).
Milne *et al.* 1989, PASA, 8, 187. MOST at 843 MHz (43″×52″ : $S$ = 153±40 Jy), and Parkes 64-m at 8.4 GHz (3′ : $S$ = 68±5 Jy), including polarisation.
Seward 1990, ApJS, 73, 781. Einstein observations.
Kassim *et al.* 1993, ApJ, 419, 733. ROSAT image.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×52″ : $S > 130$).
Rosado *et al.* 1996, A&A, 315, 243. Optical kinematics.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Dickel *et al.* 2000, ApJ, 543, 840. ATCA at 1.34 GHz (8.″5×6.″4 : $S > 60$ Jy), 4.80 GHz (3.″8 : $S$ = 25 Jy for core only) and 8.64 GHz (3.″2 : $S$ = 15 Jy for core only).
Temim *et al.* 2013, ApJ, 768, 61. XMM and Chandra observations.
Yatsu *et al.* 2013, ApJ, 773, 25. XMM and Chandra observations.


## G327.1–1.1

**RA:** $15^h54^m25^s$ **1-GHz flux/Jy:** 7? **Size/arcmin:** 18
**Dec:** –55°09′ **Spectral index:** ? **Type:** C

**Radio:** Shell, with off-centre core.
**X-ray:** Diffuse, with core.

**References:**


Milne & Dickel 1974, AuJPh, 27, 549. Parkes 64-m at 2.7 GHz (8.′4 : $S$ = 10±15% Jy).
Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 10.6 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 4.3 Jy).
Lamb & Markert 1981, ApJ, 244, 94. Einstein observations.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×52″ : $S$ = 7.6 Jy).
Seward *et al.* 1996, ApJ, 471, 887. ROSAT observations.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Sun *et al.* 1999, ApJ, 511, 274. ASCA and ROSAT observations.
Bocchino & Bandiera 2003, A&A, 398, 195. BeppoSAX observations.
Temim *et al.* 2009, ApJ, 691, 895. Chandra and XMM observations.

## G327.2–0.1

**RA:** $15^h50^m55^s$ **1-GHz flux/Jy:** 0.4 **Size/arcmin:** 5
**Dec:** –54°18′ **Spectral index:** ? **Type:** S

Has been called G327.24–0.13.

**Radio:** Shell, possibly with central emission.
**Point sources:** Central pulsar (magnetar).

**References:**

Camilo *et al.* 2007, ApJ, 666, L93. Pulsar observations.
Gelfand & Gaensler 2007, ApJ, 667, 1111. Chandra and XMM observations, and 843 GHz ($43''\times53'' : S = 0.5\pm0.1$ Jy) and SGPS at 1.4 GHz ($S=0.3\pm0.1$ Jy).

## G327.4+0.4 Kes 27

**RA:** $15^h48^m20^s$ **1-GHz flux/Jy:** 30? **Size/arcmin:** 21
**Dec:** –53°49′ **Spectral index:** 0.6 **Type:** S

Has been called G327.3+0.4 and G327.3+0.5.

**Radio:** Incomplete, multi-arc shell, brightest to the SE.
**X-ray:** Diffuse, best defined to E.
**Distance:** HI absorption indicates 4.3 to 5.4 kpc.

**References:**

Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S=58$ Jy) and Parkes 64-m at 5 GHz (4′ : $S=12.4$ Jy).
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8.′4) and 5 GHz (4.′4).
Lamb & Markert 1981, ApJ, 244, 94. Einstein observations.
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz ($44''\times55''$).
Milne *et al.* 1989, PASA, 8, 187. MOST at 843 MHz ($43''\times53'' : S = 32.2\pm6$ Jy), and Parkes 64-m at 8.4 GHz ($3' : S=9.4\pm0.8$ Jy), including polarisation.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times53'' : S=25$ Jy).
Seward *et al.* 1996, ApJ, 471, 887. ROSAT observations.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m and ATCA OH observations.
McClure-Griffiths *et al.* 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz ($2.'0\times1.'8$), plus HI.
Enoguchi *et al.* 2002, PASJ, 54, 229. ASCA observations.
Kawasaki *et al.* 2005, ApJ, 631, 935. ASCA observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.
Chen *et al.* 2008, ApJ, 676, 1040. Chandra observations.

## G327.4+1.0

**RA:** $15^h46^m48^s$ **1-GHz flux/Jy:** 1.9? **Size/arcmin:** 14
**Dec:** –53°20′ **Spectral index:** ? **Type:** S

**Radio:** Asymmetric shell.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times54'' : S=2.1$ Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
McClure-Griffiths *et al.* 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz ($2.'0\times1.'8$), plus HI.

## G327.6+14.6 SN1006, PKS 1459–41

**RA:** $15^h02^m50^s$ **1-GHz flux/Jy:** 19 **Size/arcmin:** 30
**Dec:** $-41°56'$ **Spectral index:** 0.6 **Type:** S

This is the remnant of the SN of AD1006.

**Radio:** Shell, with two bright arcs.

**Optical:** Filaments to the NW, with broad Hα component.

**X-ray:** Thermal shell, with non-thermal limb-brightened arcs.

**Point sources:** The background Schweizer–Middleditch star is near the middle of the remnant.

**Distance:** Optical spectra and proper motion indicate 2.2 kpc.


**References:**

van den Bergh 1976, ApJ, 208, L17. Optical observations.
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
Becker *et al.* 1980, ApJ, 240, L33. X-ray spectroscopy.
Schweizer & Middleditch 1980, ApJ, 241, 1039. Possible stellar remnant.
Pye *et al.* 1981, MNRAS, 194, 569. Einstein observations.
Caswell *et al.* 1983, MNRAS, 204, 921. FIRST at 1415 MHz (77″).
Reynolds & Gilmore 1986, AJ, 92, 1138. VLA at 1.37 and 1.67 GHz (16″×20″).
Kirshner *et al.* 1987, ApJ, 315, L135. Broad Hα optical component.
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×66″).
Fesen *et al.* 1988, ApJ, 327, 164. UV absorption spectra of the Schweizer–Middleditch star.
Roger *et al.* 1988, ApJ, 332, 940. MOST at 843 MHz (44″×66″: $S = 17.5 \pm 1.5$ Jy).
Long *et al.* 1988, ApJ, 333, 749. Optical proper motion for distance.
Jones & Pye 1989, MNRAS, 238, 567. EXOSAT observations.
Leahy *et al.* 1991, ApJ, 374, 218. HEAO-1 X-ray spectra.
Wu *et al.* 1993, ApJ, 416, 247. UV spectra.
Reynolds & Gilmore 1993, AJ, 106, 272. VLA at 1.37 and 1.67 GHz (24″), including polarisation.
Moffett *et al.* 1993, AJ, 106, 1566. VLA at 1.37 and 1.67 GHz (10″×14″), for proper motion studies.
Ozaki *et al.* 1994, PASJ, 46, 367. X-ray observations.
Raymond *et al.* 1995, ApJ, 454, L31. Far UV spectroscopy.
Koyama *et al.* 1995, Nature, 378, 255. ASCA observations.
Willingale *et al.* 1996, MNRAS, 278, 749. ROSAT observations.
Blair *et al.* 1996, ApJ, 468, 871. Optical absorption studies.
Laming *et al.* 1996, ApJ, 472, 267. Modelling of optical spectra, including distance.
Wu *et al.* 1997, ApJ, 477, L53. Far UV absorption spectra of the Schweizer–Middleditch star.
Winkler & Long 1997, ApJ, 486, L137. UV absorption spectra of background quasar.
Winkler & Long 1997, ApJ, 491, 829. ROSAT and optical images.
Tanimori *et al.* 1998, ApJ, 497, L25. γ-ray detection.
Vink *et al.* 2000, A&A, 354, 931. X-ray spectroscopy.
Burleigh *et al.* 2000, A&A, 356, 585. Optical spectroscopy of the Schweizer–Middleditch star.
Allen *et al.* 2001, ApJ, 558, 739. ASCA, ROSAT and other X-ray observations.
Dubner *et al.* 2002, A&A, 387, 1047. ATCA at 1.4 GHz (4′.7×3′.0) for HI, plus CO observations.
Ghavamian *et al.* 2002, ApJ, 572, 888. Optical of filaments in NW.
Sollerman *et al.* 2003, A&A, 407, 249. Optical spectroscopy.
Winkler *et al.* 2003, ApJ, 585, 324. Optical proper motion studies.
Vink *et al.* 2003, ApJ, 587, L31. XMM observations.
Bamba *et al.* 2003, ApJ, 589, 827. Chandra observations of NE.
Korreck *et al.* 2004, ApJ, 615, 280. Far-uv observations.
Aharonian *et al.* 2005, A&A, 437, 135. γ-ray limit.
Winkler *et al.* 2005, ApJ, 624, 189. HST absorption towards background sources.
Kalemci *et al.* 2006, ApJ, 640, L55. γ-ray limit upper limit.
Kalemci *et al.* 2006, ApJ, 644, 274. Integral observations.
Acero *et al.* 2007, A&A, 475, 883. XMM observations.
Raymond *et al.* 2007, ApJ, 659, 1257. HST Hα observations.
Hamilton *et al.* 2007, MNRAS, 381, 771. UV spectroscopy of the Schweizer–Middleditch star.
Bamba *et al.* 2008, AdSpR, 41, 411. Suzaku observations.
Cassam-Chenaï *et al.* 2008, ApJ, 680, 1180. ATCA and VLA at 1.5 GHz (6″×9″) plus Chandra observations.
Yamaguchi *et al.* 2008, PASJ, 60, S141. Suzaku observations.
Bamba 2008, PASJ, 60, S153. Suzaku observations.
Dyer *et al.* 2009, AJ, 137, 2956. GBT and VLA observations at 1.4 GHz.
Winkler *et al.* 2011, ApJ, 742, 80. Multi-epoch UV spectroscopy of the Schweizer–Middleditch star.
Miceli *et al.* 2012, A&A, 546, A66. XMM observations.
Broersen *et al.* 2013, A&A, 552, A9. XMM observations of NW knot.
Miceli *et al.* 2013, A&A, 550, A80. XMM observations.
Katsuda *et al.* 2013, ApJ, 763, 85. Chandra proper motion study of NW.
Winkler *et al.* 2013, ApJ, 764, 156. Spitzer observations.
Uchida *et al.* 2013, ApJ, 771, 56. Suzaku observations.
Reynoso *et al.* 2013, AJ, 145, 104. VLA and ATCA at 1.4 GHz (10″), including polarisation.
Nikolić *et al.* 2013, Science, 340, 45. Optical spectroscopy.

## G328.4+0.2 (MSH 15–57)

**RA:** $15^h55^m30^s$ **1-GHz flux/Jy:** 15 **Size/arcmin:** 5
**Dec:** –53°17′ **Spectral index:** 0.0 **Type:** F

**Radio:** Amorphous emission, with central bar.
**X-ray:** Detected at high energies.
**Distance:** HI absorption indicates > 17.4 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Caswell *et al.* 1980, MNRAS, 190, 881. FIRST at 1415 MHz (50″).
Wilson 1986, ApJ, 302, 718. Lack of detection with Einstein.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×54″ : $S$=15 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Gaensler *et al.* 2000, ApJ, 542, 380. ATCA at 1.4 GHz (16.″5×19.″5 : $S$ = 14.3±0.1 Jy) and 4.5 GHz (2.″0×1.″5 : $S$ = 12.5±0.2 Jy).
Hughes *et al.* 2000, ApJ, 542, 386. ASCA observations.
McClure-Griffiths *et al.* 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (1.′8×2.′0), plus HI.
Johnston *et al.* 2004, MNRAS, 348, L19. ATCA at 19 GHz (6.″1×7.″7), including polarisation.
Gelfand *et al.* 2007, ApJ, 663, 468. ATCA at 1.4 GHz (5.″8×7.″0 : $S$ = 13.8±0.4 Jy), plus XMM observations.


## G329.7+0.4

**RA:** $16^h01^m20^s$ **1-GHz flux/Jy:** >34? **Size/arcmin:** 40×33
**Dec:** –52°18′ **Spectral index:** ? **Type:** S

**Radio:** Diffuse shell, in complex region.

**References:**


Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×53″ : $S$ > 38).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
McClure-Griffiths *et al.* 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (2.′0×1.′8), plus HI.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.


## G330.0+15.0 Lupus Loop

**RA:** $15^h10^m00^s$ **1-GHz flux/Jy:** 350? **Size/arcmin:** 180?
**Dec:** –40°00′ **Spectral index:** 0.5? **Type:** S

**Radio:** Low surface brightness loop with HI shell.
**X-ray:** Detected, with central source.
**Point sources:** Central, possibly pulsating, X-ray source.

**References:**


Milne 1971, AuJPh, 24, 757. Parkes 64-m at 408 MHz (48′), 635 MHz (31′) and 1410 MHz (15′).
Milne & Dickel 1974, AuJPh, 27, 549. Parkes 64-m at 2.7 GHz (8.′4 : $S$ = 120±30% Jy).
Toor 1980, A&A, 85, 184. X-ray image and spectrum.
Colomb & Dubner 1982, A&A, 112, 141. Argentine 30-m dish at 1.42 GHz (30′), HI observations.
Leahy *et al.* 1991, ApJ, 374, 218. HEAO-1 X-ray spectra.
Ozaki *et al.* 1994, PASJ, 46, 367. X-ray observations.
Kaplan *et al.* 2006, ApJS, 163, 344. X-ray upper limit on compact sources.
Shinn *et al.* 2006, ApJ, 644, L189. Far UV observations.


## G330.2+1.0

**RA:** $16^h01^m06^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 11
**Dec:** –51°34′ **Spectral index:** 0.3 **Type:** S?

**Radio:** Clumpy non-thermal emission, possibly a distorted shell.
**X-ray:** Shell.
**Point sources:** Central compact X-ray source.
**Distance:** HI absorption indicates > 4.9 kpc.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 8.6 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 4.0 Jy).
Caswell *et al.* 1983, MNRAS, 204, 915. FIRST at 1415 MHz (52″×47″), and MOST at 843 MHz (43″×55″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×55″ : $S$ = 4.7 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
McClure-Griffiths *et al.* 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (2.′0×1.′8), plus HI.
Torii *et al.* 2006, PASJ, 58, L11. ASCA detection.
Park *et al.* 2009, ApJ, 695, 431. XMM and Chandra observations.

## G332.0+0.2

**RA:** $16^h13^m17^s$ **1-GHz flux/Jy:** 8? **Size/arcmin:** 12
**Dec:** –50°53′ **Spectral index:** 0.5 **Type:** S

**Radio:** Incomplete shell.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×57″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×55″: $S$=8.9 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
McClure-Griffiths *et al.* 2001, ApJ, 551, 394. ATCA and Parkes 64-m at 1.4 GHz (2.′0×1.′8), plus HI.


## G332.4–0.4 RCW 103

**RA:** $16^h17^m33^s$ **1-GHz flux/Jy:** 28 **Size/arcmin:** 10
**Dec:** –51°02′ **Spectral index:** 0.5 **Type:** S

**Radio:** Shell, brightest to the S.
**Optical:** Filaments correspond well to the radio shell, brightest in SE.
**X-ray:** Brightest to NW, with point source near centre.
**Point sources:** Central, variable X-ray source, and nearby pulsar.
**Distance:** HI absorption indicates 3.1 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Tuohy & Garmire 1980, ApJ, 239, L107. Einstein detection of X-ray point source.
Caswell *et al.* 1980, MNRAS, 190, 881. FIRST at 1415 MHz (50″).
Lamb & Markert 1981, ApJ, 244, 94. Einstein observations.
Ruiz 1983, AJ, 88, 1210. Optical spectra.
Tuohy *et al.* 1983, ApJ, 268, 778. X-ray observations.
Leibowitz & Danziger 1983, MNRAS, 204, 273. Optical spectra.
Nugent *et al.* 1984, ApJ, 284, 612. X-ray spectrum (and Einstein image from Tuohy, private communication).
Meaburn & Allen 1986, MNRAS, 222, 593. Optical spectra.
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×57″).
Oliva *et al.* 1990, A&A, 240, 453. IR spectroscopy.
Dickel *et al.* 1996, AJ, 111, 340. ATCA at 1.36 (8″) and 2.37 GHz (4.″5), including polarisation.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×55″: $S$=34 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Gotthelf *et al.* 1997, ApJ, 487, L175. ASCA observations of compact X-ray source.
Carter *et al.* 1997, PASP, 109, 990. Optical expansion.
Torii *et al.* 1998, ApJ, 494, L207. ASCA detection of nearby pulsar.
Kaspi *et al.* 1998, ApJ, 503, L161. Pulsar observations.
Gotthelf *et al.* 1999, ApJ, 514, L107. X-ray variability of central source.
Oliva *et al.* 1999, A&A, 343, 943. ISO spectroscopy.
Torii *et al.* 2000, ApJ, 534, L71. X-ray timing on pulsar, including glitch.
Reynoso *et al.* 2004, PASA, 21, 82. ATCA at 1.4 GHz (50″), including HI absorption to central source.
Russeil *et al.* 2005, A&A, 429, 497. Hα observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Paron 2006, PASA, 23, 69. CO and $HCO^+$ observations of surroundings.
De Luca 2006, Science, 313, 814. XMM observations of central source.
De Luca 2007, Ap&SS, 308, 231. XMM observation of periodicity of central source.
Matsumoto *et al.* 2007, PASJ, 59, S199. Suzaku observations.
De Luca 2008, ApJ, 682, 1185. IR observations of central source.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.

## G332.4+0.1 MSH 16–51, Kes 32

**RA:** $16^h15^m20^s$ **1-GHz flux/Jy:** 26 **Size/arcmin:** 15
**Dec:** –50°42′ **Spectral index:** 0.5 **Type:** S

Has been called G332.4+0.2.

**Radio:** Distorted shell, with thermal jet and plume adjacent.
**Optical:** Detected.
**X-ray:** Shell, brightest to NW.
**Point sources:** Pulsar nearby.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Roger *et al.* 1985, Nature, 316, 44. MOST at 843 MHz (44″×57″).
Caraveo 1993, ApJ, 415, L111. Nearby pulsar.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×56″ : $S$=29 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Brinkmann *et al.* 1999, A&A, 346, 599. ROSAT image of remnant and nearby pulsar.
Vink *et al.* 2004, ApJ, 604, 693. Chandra observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G332.5–5.6

**RA:** $16^h43^m20^s$ **1-GHz flux/Jy:** 2? **Size/arcmin:** 35
**Dec:** –54°30′ **Spectral index:** 0.7? **Type:** S

**Radio:** Bipolar shell, with central emission also.
**Optical:** Patchy filaments.
**X-ray:** Emission from centre.

**References:**

Reynoso & Green 2007, MNRAS, 375, 92. ATCA at 1.4 GHz (40″ : $S$ = 1.90±0.15 Jy) and 2.4 GHz (90″ : $S$ = 1.3±0.2 Jy) including polarisation, and 843 MHz (43″×53″) plus ROSAT observations.
Stupar *et al.* 2007, MNRAS, 381, 377. Optical observations, plus ATCA at 1.4 GHz (58″) and 2.4 GHz (95″) including polarisation, and other observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G335.2+0.1

**RA:** $16^h27^m45^s$ **1-GHz flux/Jy:** 16 **Size/arcmin:** 21
**Dec:** –48°47′ **Spectral index:** 0.5 **Type:** S

**Radio:** Well defined shell.
**Point sources:** Old pulsar within remnant boundary.

**References:**

Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 27.1 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=8.6 Jy).
Kaspi *et al.* 1996, AJ, 111, 2028. Pulsar observations.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×57″ : $S$=16 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.

## G336.7+0.5

**RA:** $16^h32^m11^s$ **1-GHz flux/Jy:** 6 **Size/arcmin:** 14×10
**Dec:** –47°19′ **Spectral index:** 0.5 **Type:** S

**Radio:** Irregular shell.
**Optical:** Detected.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×60″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×58″ : $S$=6.1 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G337.0−0.1 (CTB 33)

**RA:** $16^h35^m57^s$ **1-GHz flux/Jy:** 1.5 **Size/arcmin:** 1.5
**Dec:** –47°36′ **Spectral index:** 0.6? **Type:** S

This entry refers to a small (1′.5) SNR, not the larger previously catalogued G337.0–0.1. Has mistakenly been called G337.7–0.1.

**Radio:** Shell, in a complex region.
**Point sources:** Associated with a soft gamma repeater.
**Distance:** Association with CTB 33 gives 11 kpc.

**References:**


Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×58″ : $S$=21 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant, including masers.
Sarma *et al.* 1997, ApJ, 483, 335. ATCA at 1.4 GHz (12″) including HI, and 8.9 GHz (13″×15″) for recombination lines, clarifying extent of the remnant.
Woods *et al.* 1999, ApJ, 519, L139. Soft gamma repeater observations.
Hurley *et al.* 2000, ApJ, 528, L21. ASCA observations of soft gamma repeater.
Brogan *et al.* 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
Castro *et al.* 2013, ApJ, 774, 36. Fermi observations.


## G337.2−0.7

**RA:** $16^h39^m28^s$ **1-GHz flux/Jy:** 1.5 **Size/arcmin:** 6
**Dec:** –47°51′ **Spectral index:** 0.4 **Type:** S

**Radio:** Shell, brighter in S.
**X-ray:** Extended emission.
**Distance:** HI absorption suggests 2.0 to 9.3 kpc.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$= 3.8 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=0.70 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×58″ : $S$=2.0 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Rakowski *et al.* 2001, ApJ, 548, 258. ASCA and ROSAT observations.
Rakowski *et al.* 2006, ApJ, 646, 982. ATCA observations at 1.3 GHz (15″ : $S$ = 1.55±0.05 Jy) and 5 GHz (15″ : $S$ = 0.93±0.02 Jy), plus HI and Chandra observations.


## G337.2+0.1

**RA:** $16^h35^m55^s$ **1-GHz flux/Jy:** 1.5? **Size/arcmin:** 3×2
**Dec:** –47°20′ **Spectral index:** ? **Type:** ?

**Radio:** Not well defined.
**X-ray:** Detected.
**Distance:** Association with HI hole gives 14 kpc.

**References:**


Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″ : $S$=1.6 Jy)
Combi *et al.* 2005, A&A, 431, L9. ASCA and other observations.
Aharonian *et al.* 2006, ApJ, 636, 777. γ-ray observations of nearby source.
Combi *et al.* 2006, ApJ, 653, L41. XMM observations.


## G337.3+1.0 Kes 40

**RA:** $16^h32^m39^s$ **1-GHz flux/Jy:** 16 **Size/arcmin:** 15×12
**Dec:** –46°36′ **Spectral index:** 0.55 **Type:** S

**Radio:** Nearly complete shell.

**References:**


Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S$=24.6 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=7.2 Jy).
Dickel & Milne 1976, AuJPh, 29, 435. Comparison of earlier Parkes 64-m maps at 2.7 GHz (8′.4) and 5 GHz (4′.4).
Kesteven & Caswell 1987, A&A, 183, 118. MOST at 843 MHz (44″×61″).
Milne *et al.* 1989, PASA, 8, 187. MOST at 843 MHz (43″×59″ : $S$ = 14.8±3.0 Jy), and Parkes 64-m at 8.4 GHz (3′ : $S$=5.1±0.6 Jy), including polarisation.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″ : $S$=20 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G337.8−0.1 Kes 41

**RA:** $16^h39^m01^s$ **1-GHz flux/Jy:** 18 **Size/arcmin:** 9×6
**Dec:** –46°59′ **Spectral index:** 0.5 **Type:** S

**Radio:** Distorted shell.
**X-ray:** Centrally brightened.
**Distance:** HI absorption suggests 11 kpc.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″: $S$=18 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA detection of compact OH emission.
Caswell 2004, MNRAS, 349, 99. ATCA at 1.7 GHz, for associated OH masers.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.
Kothes & Dougherty 2007, A&A, 468, 993. SGPS at 1.4 GHz including HI.
Combi *et al.* 2008, A&A, 488, L25. XMM observations.

## G338.1+0.4

**RA:** $16^h37^m59^s$ **1-GHz flux/Jy:** 4? **Size/arcmin:** 15?
**Dec:** –46°24′ **Spectral index:** 0.4 **Type:** S

**Radio:** Arc in NE, merging with thermal emission in S.
**Optical:** Detected.
**X-ray:** Detected.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Zealey *et al.* 1979, A&AS, 38, 39. Optical detection.
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″: $S$=3.8 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Caswell 2004, MNRAS, 349, 99. ATCA at 1.7 GHz of associated OH masers.

## G338.3−0.0

**RA:** $16^h41^m00^s$ **1-GHz flux/Jy:** 7? **Size/arcmin:** 8
**Dec:** –46°34′ **Spectral index:** ? **Type:** C?

**Radio:** Irregular shell, in complex region.
**X-ray:** Central X-ray source and nebula.
**Point sources:** Central X-ray source.
**Distance:** HI observations suggest 8 to 13 kpc.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″: $S$=7.4 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Aharonian *et al.* 2005, Science, 307, 1938. γ-ray detection.
Aharonian *et al.* 2006, ApJ, 636, 777. γ-ray observations.
Landi *et al.* 2006, ApJ, 651, 190. X-ray observations.
Funk *et al.* 2007, ApJ, 662, 517. XMM observations.
Lemiere *et al.* 2009, ApJ, 706, 1269. Chandra observations of central source and nebula.
Slane *et al.* 2010, ApJ, 720, 266. Fermi observations.
Castelletti *et al.* 2011, A&A, 536, A98. GMRT at 235 MHz (10″×26″), 610 MHz (5.″0×12.″6) and 1280 MHz (5.″0×6.″4), plus ATCA at 2.3 GHz (4.″3×4.″8).

## G338.5+0.1

**RA:** $16^h41^m09^s$ **1-GHz flux/Jy:** 12? **Size/arcmin:** 9
**Dec:** –46°19′ **Spectral index:** ? **Type:** ?

**Radio:** Circle of non-thermal emission in complex region, not well defined.
**Distance:** HI absorption suggests 11 kpc.

**References:**

Shaver & Goss 1970, AuJPA, 14, 133. Molonglo at 408 MHz (3′) and Parkes 64-m at 5 GHz (4′).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×59″ : $S$=13 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Kothes & Dougherty 2007, A&A, 468, 993. SGPS at 1.4 GHz including HI.

## G340.4+0.4

**RA:** $16^h46^m31^s$ **1-GHz flux/Jy:** 5 **Size/arcmin:** 10×7
**Dec:** –44°39′ **Spectral index:** 0.4 **Type:** S

**Radio:** Distorted shell, elongated east–west.
**Optical:** Detected.

**References:**

Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$= 8.2 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=2.9 Jy).
Caswell *et al.* 1983, MNRAS, 203, 595. FIRST at 1415 MHz (50″).
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 330 MHz (75″×48″ : $S$ = 9.8±0.9 Jy) and 1.4 GHz (27″×9″ : $S$ = 3.6±0.1 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×61″ : $S$=5.9 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G340.6+0.3

**RA:** $16^h47^m41^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 6
**Dec:** –44°34′ **Spectral index:** 0.4? **Type:** S

**Radio:** Incomplete shell.
**Optical:** Possible associated filaments.
**Distance:** HI absorption suggests 15 kpc.

**References:**

Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$= 7.0 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=2.8 Jy).
Zealey *et al.* 1979, A&AS, 38, 39. Optical observations.
Caswell *et al.* 1983, MNRAS, 203, 595. FIRST at 1415 MHz (50″).
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 330 MHz (75″×48″ : $S$ = 9.2±0.9 Jy) and 1.4 GHz (27″×9″ : $S$ = 5.8±0.1 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×61″ : $S$=4.5 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer possible detection.
Kothes & Dougherty 2007, A&A, 468, 993. SGPS at 1.4 GHz including HI.

## G341.2+0.9

**RA:** $16^h47^m35^s$ **1-GHz flux/Jy:** 1.5? **Size/arcmin:** 22×16
**Dec:** –43°47′ **Spectral index:** 0.6? **Type:** C

**Radio:** Incomplete shell, with extension to SW.
**Point sources:** Pulsar in W, with wind nebula.

**References:**

Frail *et al.* 1994, ApJ, 437, 781. VLA at 330 MHz (54″×116″ : $S$=3.0±0.1 Jy) and 1.4 GHz (21″×25″ : $S$=12.5±0.05 Jy).
Giacani *et al.* 2001, AJ, 121, 3133. VLA at 1.4 and 4.9 GHz (25″) of pulsar wind nebula.

## G341.9−0.3

**RA:** $16^h55^m01^s$ **1-GHz flux/Jy:** 2.5 **Size/arcmin:** 7
**Dec:** –44°01′ **Spectral index:** 0.5 **Type:** S

**Radio:** Incomplete shell, brightest to NE.

**References:**

Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′: $S$=7.4 Jy) and Parkes 64-m at 5 GHz (4′: $S$=1.7 Jy).
Caswell *et al.* 1983, MNRAS, 203, 595. FIRST at 1415 MHz (50″), revision of previous flux densities.
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 1.4 GHz (35″×11″: $S$=2.2±0.1 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×62″: $S$=2.7 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.

## G342.0−0.2

**RA:** $16^h54^m50^s$ **1-GHz flux/Jy:** 3.5? **Size/arcmin:** 12×9
**Dec:** –43°53′ **Spectral index:** 0.4? **Type:** S

**Radio:** Distorted shell.

**References:**

Caswell *et al.* 1983, MNRAS, 203, 595. FIRST at 1415 MHz (50″), estimate $S_{408\ MHz}$ = 5 Jy, $S_{5\ GHz}$ = 2 Jy from previous maps.
Dubner *et al.* 1996, AJ, 111, 1304. VLA at 1.4 GHz (35″×11″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×62″: $S$=3.5 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.

## G342.1+0.9

**RA:** $16^h50^m43^s$ **1-GHz flux/Jy:** 0.5? **Size/arcmin:** 10×9
**Dec:** –43°04′ **Spectral index:** ? **Type:** S

**Radio:** Incomplete shell.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×63″: $S$=0.6 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G343.0−6.0 RCW 114

**RA:** $17^h25^m00^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 250
**Dec:** –46°30′ **Spectral index:** ? **Type:** S

**Radio:** Faint, poorly defined.
**Optical:** Filamentary shell.

**References:**

Walker & Zealey 2001, MNRAS, 325, 287. Optical observations, and review of earlier observations.
Welsh *et al.* 2003, A&A, 403, 605. Optical spectroscopy.
Casandjian & Grenier 2008, A&A, 489, 849. γ-ray observations.
Kim *et al.* 2010, ApJ, 709, 823. UV observations.

## G343.1−2.3

**RA:** $17^h08^m00^s$ **1-GHz flux/Jy:** 8? **Size/arcmin:** 32?
**Dec:** $-44°16'$ **Spectral index:** 0.5? **Type:** C?

**Radio:** Incomplete shell?
**X-ray:** Pulsar wind nebula.
**Point sources:** Pulsar near edge, with wind nebula.

**References:**

McAdam *et al.* 1993, Nature, 361, 516. MOST at 843 MHz (smoothed to 2′).
Frail *et al.* 1994, ApJ, 437, 781. VLA at 330 MHz ($56''\times111''$: $S$=10.6 Jy) and 1.4 GHz ($22''\times27''$) near pulsar.
Becker *et al.* 1995, A&A, 298, 528. ROSAT of pulsar, and limit for remnant.
Giacani *et al.* 2001, AJ, 121, 3133. VLA at 1.4, 4.9 and 8.5 GHz (25″) of pulsar wind nebula.
Gotthelf *et al.* 2002, ApJ, 567, L125. Pulsar x-ray detection.
Dodson & Golap 2002, MNRAS, 334, L1. ATCA at 1.4 GHz ($70''\times47''$) including polarisation, and Chandra observations of pulsar wind nebula.
Aharonian *et al.* 2005, A&A, 432, L9. γ-ray limit.
Abramowski *et al.* 2011, A&A, 528, A143. γ-ray observations.

## G343.1−0.7

**RA:** $17^h00^m25^s$ **1-GHz flux/Jy:** 7.8 **Size/arcmin:** 27×21
**Dec:** $-43°14'$ **Spectral index:** 0.55 **Type:** S

**Radio:** Shell, with smaller thermal shell adjacent.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times63''$ : $S$8.5±0.6), plus Parkes 64-m at 4.5 GHz ($S$ = 3.9±0.6 Jy) and 8.55 GHz ($S$=2.4±0.5 Jy)
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.

## G344.7−0.1

**RA:** $17^h03^m51^s$ **1-GHz flux/Jy:** 2.5? **Size/arcmin:** 8
**Dec:** $-41°42'$ **Spectral index:** 0.3? **Type:** C?

**Radio:** Asymmetric shell, with possible core.
**X-ray:** Detected.
**Distance:** HI absorption and association with features suggests 6.3 kpc.

**References:**

Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$= 4.7 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=1.3 Jy).
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz ($30''\times43''$ : $S$=1.7±0.1 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times65''$ : $S$=2.5 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Yamauchi *et al.* 2005, PASJ, 57, 459. ASCA observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Giacani *et al.* 2011, A&A, 531, A138. VLA and ATCA at 1.4 GHz (5″.6×8″), ATCA at 5 GHz ($10''\times13''$) and 8.4 GHz ($5''\times10''$), plus XMM observations and HI from SGPS.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.
Yamaguchi *et al.* 2012, ApJ, 749, 137. Suzaku observations.
Yang *et al.* 2013, ApJ, 766, 44. Suzaku spectroscopy.

## G345.7−0.2

**RA:** $17^h07^m20^s$ **1-GHz flux/Jy:** 0.6? **Size/arcmin:** 6
**Dec:** $-40°53'$ **Spectral index:** ? **Type:** S

**Radio:** Poorly defined diffuse shell.
**Point sources:** Old pulsar nearby.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times66''$ : $S$=0.7 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.

## G346.6−0.2

**RA:** $17^h10^m19^s$ **1-GHz flux/Jy:** 8? **Size/arcmin:** 8
**Dec:** –40°11′ **Spectral index:** 0.5? **Type:** S

**Radio:** Irregular shell.
**X-ray:** Centrally brightened.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3' : S =$ 14.9 Jy) and Parkes 64-m at 5 GHz ($4' : S = 4.3$ Jy).
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz ($31'' \times 43'' : S = 8.1 \pm 0.9$ Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 67'' : S = 8.7$ Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA detection of compact OH emission.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Hewitt *et al.* 2009, ApJ, 694, 1266. Spitzer spectroscopy.
Sezer *et al.* 2011, MNRAS, 415, 301. Suzaku observations.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.
Yamauchi *et al.* 2013, PASJ, 65, 6. Suzaku observations.


## G347.3−0.5 RX J1713.7–3946

**RA:** $17^h13^m50^s$ **1-GHz flux/Jy:** 30? **Size/arcmin:** 65×55
**Dec:** –39°45′ **Spectral index:** ? **Type:** S?

**Radio:** Faint emission.
**X-ray:** Non-thermal, limb-brightened to W, with central source.
**Point sources:** Central X-ray source.
**Distance:** Association with molecular clouds and X-ray observations imply 1.3 kpc.

**References:**


Koyama *et al.* 1997, PASJ, 49, L7. ASCA of NW.
Slane *et al.* 1999, ApJ, 525, 357. ASCA and other observations.
Muraishi *et al.* 2000, A&A, 354, L57. High energy γ-ray detection.
Butt *et al.* 2001, ApJ, 562, L167. Associated γ-ray emission.
Ellison *et al.* 2001, ApJ, 563, 191. ATCA at 1.4 GHz ($46'' \times 36''$), and ASCA observations.
Enomoto *et al.* 2002, Nature, 416, 823. γ-ray observations.
Uchiyama *et al.* 2002, PASJ, 54, L73. ASCA observations.
Uchiyama *et al.* 2003, A&A, 400, 567. Chandra spectroscopy.
Pannuti *et al.* 2003, ApJ, 593, 377. ROSAT and ASCA observations.
Lazendic *et al.* 2003, ApJ, 593, L27. Chandra, XMM and other X-ray observations of central source.
Fukui *et al.* 2003, PASJ, 55, L61. CO observations of surroundings.
Cassam-Chenaï *et al.* 2004, A&A, 427, 199. XMM and other observations.
Aharonian *et al.* 2004, Nature, 432, 75. γ-ray detection.
Lazendic *et al.* 2004, ApJ, 602, 271. Chandra observations of parts, and ATCA at 1.4 GHz ($36'' \times 46''$).
Hiraga *et al.* 2005, A&A, 431, 953. XMM observations,
Moriguchi *et al.* 2005, ApJ, 631, 947. CO observations of surroundings.
Aharonian *et al.* 2007, A&A, 464, 235. γ-ray observations.
*see also:* Aharonian *et al.* 2011, A&A, 531, C1. Erratum.
Uchiyama *et al.* 2007, Nature, 449, 576. Chandra multi-epoch observations for study of small-scale variability.
Tanaka *et al.* 2008, ApJ, 685, 988. Suzaku observations.
Takahashi *et al.* 2008, PASJ, 60, S131. Suzaku observations of SW.
Mignani *et al.* 2008, A&A, 484, 457. Optical and IR observations of central source.
Acero *et al.* 2009, A&A, 505, 157. XMM observations, plus other radio, IR and γ-ray data.
Sano *et al.* 2010, ApJ, 724, 59. CO observations of region.
Maxted *et al.* 2012, MNRAS, 422, 2230. Molecular line observations.
*see also:* Maxted *et al.* 2013, MNRAS, 430, 2511. Erratum.
Sano *et al.* 2013, ApJ, 778, 59. CO, SGPS HI and Suzaku observations.


## G348.5−0.0

**RA:** $17^h15^m26^s$ **1-GHz flux/Jy:** 10? **Size/arcmin:** 10?
**Dec:** –38°28′ **Spectral index:** 0.4? **Type:** S?

**Radio:** Arc, overlapping G348.5+0.1.

**References:**


Kassim *et al.* 1991, ApJ, 374, 212. VLA at 333 MHz ($46'' \times 53''$), 1.4 GHz ($18'' \times 33''$) and part at 5 GHz ($2''.5 \times 3''.9$).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43'' \times 69'' : S = 10.2$ Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant, including masers.
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Hewitt *et al.* 2009, ApJ, 694, 1266. Spitzer spectroscopy.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.

## G348.5+0.1 CTB 37A

**RA:** $17^h14^m06^s$ **1-GHz flux/Jy:** 72 **Size/arcmin:** 15
**Dec:** $-38°32'$ **Spectral index:** 0.3 **Type:** S

**Radio:** Shell, poorly define to S and W, overlapping G348.5–0.0 in E.
**X-ray:** Brighter to W.
**Distance:** HI absorption indicates 8.0 kpc.

**References:**

Clark *et al.* 1975, AuJPA, 37, 75. Molonglo at 408 MHz ($3'$:$S$= 97 Jy).
Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz ($4\farcm4$:$S$=43 Jy).
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Milne *et al.* 1979, MNRAS, 188, 437. FIRST at 1415 MHz ($0\farcm8$:$S>50$) and Parkes 64-m at 14.7 GHz ($2\farcm2$:$S=18\pm5$ Jy).
Downes 1984, MNRAS, 210, 845. VLA at 1465 MHz ($20''\times45''$).
Kassim *et al.* 1991, ApJ, 374, 212. VLA at 333 MHz ($46''\times53''$), 1.4 GHz ($18''\times33''$) and part at 5 GHz ($2\farcm5\times3\farcm9$).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times69''$:$S$=71 Jy).
Brogan *et al.* 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
Reynoso & Mangum 2000, ApJ, 545, 874. CO observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Aharonian *et al.* 2008, A&A, 490, 685. γ-ray observations.
Castro & Slane 2010, ApJ, 717, 372. Fermi observations.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.
Sezer *et al.* 2011, MNRAS, 417, 1387. Suzaku observations.
Tian & Leahy 2012, MNRAS, 421, 2593. SGPS HI absorption observations.
Maxted *et al.* 2013, MNRAS, 434, 2188. Molecular line observations of region.

## G348.7+0.3 CTB 37B

**RA:** $17^h13^m55^s$ **1-GHz flux/Jy:** 26 **Size/arcmin:** 17?
**Dec:** $-38°11'$ **Spectral index:** 0.3 **Type:** S

**Radio:** Incomplete shell with faint eastern extensions.
**X-ray:** Diffuse emission.
**Point sources:** X-ray pulsar.
**Distance:** HI absorption suggests 13 kpc.

**References:**

Clark *et al.* 1975, AuJPA, 37, 75. Molonglo at 408 MHz ($3'$:$S$= 34 Jy).
Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz ($4\farcm4$:$S$=32 Jy).
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Milne *et al.* 1979, MNRAS, 188, 437. FIRST at 1415 MHz ($0\farcm8$:$S>20$) and Parkes 64-m at 14.7 GHz ($2\farcm2$:$S=8\pm3$ Jy).
Downes 1984, MNRAS, 210, 845. VLA at 1465 MHz ($20''\times45''$).
Kassim *et al.* 1991, ApJ, 374, 212. VLA at 333 MHz ($46''\times53''$).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times69''$:$S$=33 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.
Aharonian *et al.* 2006, ApJ, 636, 777. γ-ray detection.
Aharonian *et al.* 2008, A&A, 486, 829. γ-ray and Chandra observations.
Nakamura *et al.* 2009, PASJ, 61, S197. Suzaku and Chandra observations.
Halpern & Gotthelf 2010, ApJ, 710, 941. Chandra detection of pulsar.
Halpern & Gotthelf 2010, ApJ, 725, 1384. Chandra observations of pulsar.
Tian & Leahy 2012, MNRAS, 421, 2593. SGPS HI observations.

## G349.2−0.1

**RA:** $17^h17^m15^s$ **1-GHz flux/Jy:** 1.4? **Size/arcmin:** 9×6
**Dec:** $-38°04'$ **Spectral index:** ? **Type:** S

**Radio:** Elongated shell, adjacent to bright HII region.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times70''$:$S$=1.6 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant.

## G349.7+0.2

**RA:** $17^h17^m59^s$ **1-GHz flux/Jy:** 20 **Size/arcmin:** 2.5×2
**Dec:** –37°26′ **Spectral index:** 0.5 **Type:** S

**Radio:** Incomplete clumpy shell, with enhancement to the S.
**X-ray:** Irregular shell, brighter to S and E.
**Distance:** HI absorption indicates 14.8 kpc, association with OH features gives 22 kpc.

**References:**


Becker & Kundu 1975, AJ, 80, 679. NRAO 140-ft at 10.6 GHz (3′).
Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′ : $S$ = 31.0 Jy) and Parkes 64-m at 5 GHz (4′ : $S$ = 9.1 Jy), no maps.
Caswell *et al.* 1975, A&A, 45, 239. Parkes HI absorption.
Shaver *et al.* 1985, Nature, 313, 113. VLA at 1.4 GHz (3.″4×14.″5).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×71″ : $S$=22 Jy).
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant, including masers.
Brogan *et al.* 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
Reynoso & Mangum 2001, AJ, 121, 347. CO observations of the vicinity.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Slane *et al.* 2002, ApJ, 580, 904. ASCA observations.
Dubner *et al.* 2004, A&A, 426, 201. CO observations of surroundings.
Lazendic *et al.* 2005, ApJ, 618, 733. Chandra observations.
Reach *et al.* 2006, AJ, 131, 1479. Spitzer observations.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Hewitt *et al.* 2009, ApJ, 694, 1266. Spitzer spectroscopy.
Castro & Slane 2010, ApJ, 717, 372. Fermi observations.
Lazendic *et al.* 2010, MNRAS, 409, 371. OH, CO and other molecular line observations of region.
Anderson *et al.* 2011, ApJ, 742, 7. Spitzer observations.


## G350.0–2.0

**RA:** $17^h27^m50^s$ **1-GHz flux/Jy:** 26 **Size/arcmin:** 45
**Dec:** –38°32′ **Spectral index:** 0.4 **Type:** S

Incorporates the previously catalogued G350.0–1.8 in the NW.
**Radio:** Shell, brightest in NW.
**Optical:** Detected.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 49.5 Jy) and Parkes 64-m at 5 GHz (4′ : $S$=13.6 Jy).
Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4.′4).
Gaensler 1998, ApJ, 493, 781. VLA and Parkes 64-m at 1.4 GHz (18″×21″ : $S$ = 22.3±0.3 Jy), clarifying extent of remnant.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.


## G350.1–0.3

**RA:** $17^h17^m40^s$ **1-GHz flux/Jy:** 6? **Size/arcmin:** 4?
**Dec:** –37°24′ **Spectral index:** 0.8? **Type:** ?

**Radio:** Several clumps of emission.
**X-ray:** Diffuse emission, with compact source.
**Point sources:** X-ray source.
**Distance:** HI absorption indicates 4.5 to 10.7 kpc, possible interaction with molecular cloud indicates 4.5 kpc.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′ : $S$ = 10.7) and Parkes 64-m at 5 GHz (4′ : $S$=1.7).
Salter *et al.* 1986, A&A, 162, 217. VLA at 1.5 (4″×10.″4) and 4.8 GHz (15″×35″) and 15 GHz (5″×2″).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×71″)..
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA observations.
Gaensler *et al.* 2008, ApJ, 680, L37. VLA at 4.8 GHz (11.″4×5.″6) plus XMM observations.
Lovchinsky *et al.* 2011, ApJ, 731, 70. Chandra and Spitzer observations.

## G351.2+0.1

**RA:** $17^h22^m27^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 7
**Dec:** $-36°11'$ **Spectral index:** 0.4 **Type:** C?

Has been called G351.3+0.2.

**Radio:** Distorted shell, with possible flat-spectrum core.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$ : $S$ = 8.1 Jy) and Parkes 64-m at 5 GHz ($4'$ : $S$ = 3.1 Jy).
Becker & Helfand 1988, AJ, 95, 883. VLA at 5 GHz ($15''$), and at 15 GHz of core.
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz ($32''\times36''$ : $S$ = 4.8±0.2 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times73''$ : $S$ = 5.5 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.


## G351.7+0.8

**RA:** $17^h21^m00^s$ **1-GHz flux/Jy:** 10 **Size/arcmin:** 18×14
**Dec:** $-35°27'$ **Spectral index:** 0.5? **Type:** S

**Radio:** Elongated shell, adjacent to bright HII region.
**Point sources:** Pulsar nearby.

**References:**


Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times74''$ : $S$ = 11 Jy).
Tian *et al.* 2007, MNRAS, 378, 1283. SGPS at 1.4 GHz ($100''$ : $S$ = 8.4±0.7 Jy) including HI.


## G351.9−0.9

**RA:** $17^h28^m52^s$ **1-GHz flux/Jy:** 1.8? **Size/arcmin:** 12×9
**Dec:** $-36°16'$ **Spectral index:** ? **Type:** S

**Radio:** Asymmetric shell.

**References:**


Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times73''$ : $S$ = 2.0 Jy).


## G352.7−0.1

**RA:** $17^h27^m40^s$ **1-GHz flux/Jy:** 4 **Size/arcmin:** 8×6
**Dec:** $-35°07'$ **Spectral index:** 0.6 **Type:** S

**Radio:** Distorted shell.
**X-ray:** Detected.
**Distance:** HI absorption indicates 6.8 to 8.4 kpc.

**References:**


Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz ($3'$ : $S$ = 9.6 Jy) and Parkes 64-m at 5 GHz ($4'$ : $S$ = 2.3 Jy).
Caswell *et al.* 1983, MNRAS, 203, 595. FIRST at 1415 MHz ($1\farcm1$).
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz ($34''$ : $S$ = 3.4±0.4 Jy).
Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz ($43''\times75''$ : $S$ = 4.4 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Kinugasa *et al.* 1998, PASJ, 50, 249. ASCA observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Giacani *et al.* 2009, A&A, 507, 841. VLA at 4.8 GHz ($9''\times12''$), plus HI and XMM observations.

## G353.6−0.7

**RA:** $17^h32^m00^s$ **1-GHz flux/Jy:** 2.5? **Size/arcmin:** 30
**Dec:** $-34°44'$ **Spectral index:** ? **Type:** S

**Radio:** Shell, brighter to S.
**X-ray:** Detected.
**Point sources:** Central X-ray source.

**References:**

Tian *et al.* 2008, ApJ, 679, L85. SGPS at 1.4 GHz (100′), plus 843 MHz (43′) and X-ray observations.
Tian *et al.* 2010, ApJ, 712, 790. XMM, Suzaku and CO observations.
Halpern & Gotthelf 2010, ApJ, 710, 941. XMM observations.
Abramowski *et al.* 2011, A&A, 531, A81. γ-ray observations.
Bamba *et al.* 2012, ApJ, 756, 149. Suzaku observations.
*see also:* Bamba *et al.* 2012, ApJ, 761, 80. Erratum.
Klochkov *et al.* 2013, A&A, 556, A41. XMM and other X-ray observations.

## G353.9−2.0

**RA:** $17^h38^m55^s$ **1-GHz flux/Jy:** 1? **Size/arcmin:** 13
**Dec:** $-35°11'$ **Spectral index:** 0.5? **Type:** S

**Radio:** Shell, with central double source.

**References:**

Green 2001, MNRAS, 326, 283. VLA at 327 MHz (3′.0×2′.7) and 1.4 GHz (42″×36″), plus 8.4 GHz (8″.4×6″.1) of central source only.

## G354.1+0.1

**RA:** $17^h30^m28^s$ **1-GHz flux/Jy:** ? **Size/arcmin:** 15×3?
**Dec:** $-33°46'$ **Spectral index:** varies **Type:** C?

Is this a SNR?
**Radio:** Elongated N–S.
**Point sources:** Pulsar at S tip.

**References:**

Frail *et al.* 1994, ApJ, 437, 781. VLA at 330 MHz (47″×99″) and 1.4 GHz (8″.8×21″).

## G354.8−0.8

**RA:** $17^h36^m00^s$ **1-GHz flux/Jy:** 2.8? **Size/arcmin:** 19
**Dec:** $-33°42'$ **Spectral index:** ? **Type:** S

**Radio:** Distorted shell.

**References:**

Whiteoak & Green 1996, A&AS, 118, 329. MOST at 843 MHz (43″×78″: $S$=3.1 Jy).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Koralesky *et al.* 1998, AJ, 116, 1323. VLA search for OH emission.

## G355.4+0.7

**RA:** $17^h31^m20^s$ **1-GHz flux/Jy:** 5? **Size/arcmin:** 25
**Dec:** $-32°26'$ **Spectral index:** ? **Type:** S

**Radio:** Faint, incomplete shell.

**References:**

Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×77″).
Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′: $S$=8.9±1.3 Jy).

## G355.6−0.0

**RA:** $17^h35^m16^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 8×6
**Dec:** −32°38′ **Spectral index:** ? **Type:** S

**Radio:** Well defined shell.

**X-ray:** Centrally brightened.

**References:**

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×80″: $S$=2.6 Jy).
Sugizaki *et al.* 2001, ApJS, 134, 77. ASCA survey observations.
Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′: $S$=3.3±0.5 Jy).
Marquez-Lopez & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.
Minami *et al.* 2013, PASJ, 65, 99. Suzaku observations.

## G355.9−2.5

**RA:** $17^h45^m53^s$ **1-GHz flux/Jy:** 8 **Size/arcmin:** 13
**Dec:** −33°43′ **Spectral index:** 0.5 **Type:** S

**Radio:** Distorted shell, brightest to SE.

**References:**

Clark *et al.* 1975, AuJPA, 37, 1. Molonglo at 408 MHz (3′: $S$=12.3 Jy) and Parkes 64-m at 5 GHz (4′: $S$=3.4 Jy).
Dubner *et al.* 1993, AJ, 105, 2251. VLA at 1.47 GHz (32″×34″: $S$=5.0±0.3 Jy).
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×77″).
Green *et al.* 1997, AJ, 114, 2058. Parkes 64-m OH observations.
Marquez-Lopez & Phillips 2010, MNRAS, 407, 94. Mid-IR observations.

## G356.2+4.5

**RA:** $17^h19^m00^s$ **1-GHz flux/Jy:** 4 **Size/arcmin:** 25
**Dec:** −29°40′ **Spectral index:** 0.7 **Type:** S

Has been called G356.2+4.4.

**Radio:** Faint shell.

**References:**

Duncan *et al.* 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz (10.′4).
Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz (3′×1.′5: $S$=8.1±1.7 Jy), and NVSS at 1.4 GHz.

## G356.3−1.5

**RA:** $17^h42^m35^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 20×15
**Dec:** −32°52′ **Spectral index:** ? **Type:** S

**Radio:** Double arc.

**References:**

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×79″: $S$=2.8 Jy).
Bhatnagar 2002, MNRAS, 332, 1. GMRT at 327 MHz (0.′8×1.′7: $S$=5.7±0.2).

## G356.3−0.3

**RA:** $17^h37^m56^s$ **1-GHz flux/Jy:** 3? **Size/arcmin:** 11×7
**Dec:** −32°16′ **Spectral index:** ? **Type:** S

Has been suggested this part of a larger SNR.

**Radio:** Diffuse emission.

**References:**

Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×81″: $S$=2.6 Jy).
Roy & Pramesh Rao 2002, MNRAS, 329, 775. GMRT at 330 MHz (2.′7×4.′8).

## G357.7−0.1 MSH 17–39

**RA:** $17^h40^m29^s$ **1-GHz flux/Jy:** 37 **Size/arcmin:** 8×3?
**Dec:** −30°58′ **Spectral index:** 0.4 **Type:** ?

Has been suggested that this is not a SNR.

**Radio:** Multiple arcs and filaments, brighter to NW 'head'.

**X-ray:** Detected from NW 'head', and SW 'tail'.

**Distance:** HI absorption suggests beyond Galactic Centre.

**References:**

Caswell *et al.* 1975, AuJPA, 37, 39. Molonglo at 408 MHz (3′: $S$=54.2 Jy) and Parkes 64-m at 5 GHz (4′: $S$=18.5 Jy).
Milne & Dickel 1975, AuJPh, 28, 209. Parkes 64-m at 5 GHz (4.′4: $S$=14.6 Jy).
Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2.′6).
Caswell *et al.* 1980, MNRAS, 190, 881. FIRST at 1415 MHz (50″).
Weiler & Panagia 1980, A&A, 90, 269. Effelsberg 100-m at 9 GHz (1.′5) (private communication from Baker).
Shaver *et al.* 1985, Nature, 313, 113. VLA at 1.4 GHz (3.″8×10.″9) and 5 GHz (12″×26″).
Becker & Helfand 1985, Nature, 313, 115. VLA at 1.4 GHz and 5 GHz.
Helfand & Becker 1985, Nature, 313, 118. Suggest it is not a SNR.
Shaver *et al.* 1985, A&A, 147, L23. Observations of peripheral compact source.
Caswell *et al.* 1989, PASA, 8, 184. MOST at 843 MHz (43″×83″).
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×84″).
Stewart *et al.* 1994, ApJ, 432, L39. ATCA at 4.79 and 5.84 GHz (12″×22″) and Effelsberg 100-m at 10.6 GHz (1′), including polarisation.
Frail *et al.* 1996, AJ, 111, 1651. OH emission near remnant, including masers.
Yusef-Zadeh *et al.* 1999, ApJ, 527, 172. VLA of nearby OH masers.
LaRosa *et al.* 2000, AJ, 119, 207. VLA at 333 MHz (43″×24″).
Brogan *et al.* 2000, ApJ, 537, 875. VLA at 1.7 GHz for OH Zeeman splitting.
Brogan & Goss 2003, AJ, 125, 272. VLA at 1.4 GHz (13.″6×11.″4), including HI, and 8.3 GHz (14.″3×6.″8) recombination line observation of HII region.
Gaensler *et al.* 2003, ApJ, 594, L35. Chandra detection.
Lazendic *et al.* 2003, AN, 324 (No S1), 157. Molecular line observations.
Burton *et al.* 2004, MNRAS, 348, 638. IR and radio observations of HII region.
Lazendic *et al.* 2004, MNRAS, 354, 393. IR and molecular line observations.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Phillips *et al.* 2009, MNRAS, 397, 1215. Observations of interactions with surroundings.
Castro *et al.* 2013, ApJ, 774, 36. Fermi observations.

## G357.7+0.3

**RA:** $17^h38^m35^s$ **1-GHz flux/Jy:** 10 **Size/arcmin:** 24
**Dec:** −30°44′ **Spectral index:** 0.4? **Type:** S

**Radio:** Non-thermal shell in complex region.

**References:**

Reich & Fürst 1984, A&AS, 57, 165. Effelsberg 100-m at 2.7 GHz (4.′3 : $S$ = 7±1.5 Jy), $S_{5\ \mathrm{GHz}}$ = 5.5±1.5 Jy from surveys.
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×84″).
Yusef-Zadeh *et al.* 1999, ApJ, 527, 172. VLA of nearby OH masers.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Phillips & Marquez-Lugo 2010, MNRAS, 409, 701. Spitzer observations of region.

## G358.0+3.8

**RA:** $17^h26^m00^s$ **1-GHz flux/Jy:** 1.5? **Size/arcmin:** 38
**Dec:** –28°36′ **Spectral index:** ? **Type:** S

**Radio:** Faint shell.

**References:**
Duncan *et al.* 1995, MNRAS, 277, 36. Parkes 64-m at 2.4-GHz (10′.4).
Bhatnagar 2000, MNRAS, 317, 453. GMRT at 327 MHz (2′.2×1′.3 : $S$=2.5±1.3 Jy), and NVSS at 1.4 GHz.

## G358.1+0.1

**RA:** $17^h37^m00^s$ **1-GHz flux/Jy:** 2? **Size/arcmin:** 20
**Dec:** –29°59′ **Spectral index:** ? **Type:** S

**Radio:** Faint shell.

**References:**
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×77″).
Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′ : $S$=6.0±2.5 Jy).

## G358.5–0.9

**RA:** $17^h46^m10^s$ **1-GHz flux/Jy:** 4? **Size/arcmin:** 17
**Dec:** –30°40′ **Spectral index:** ? **Type:** S

**Radio:** Shell, brighter to NE.

**References:**
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×77″).
Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′ : $S$=8.0±2.5 Jy).

## G359.0–0.9

**RA:** $17^h46^m50^s$ **1-GHz flux/Jy:** 23 **Size/arcmin:** 23
**Dec:** –30°16′ **Spectral index:** 0.5 **Type:** S

**Radio:** Incomplete shell.
**Optical:** Detected.
**X-ray:** Partial shell.

**References:**
Reich *et al.* 1988, IAUCo, 101, 293. Summary of parameters.
Reich *et al.* 1990, A&AS, 85, 633. Effelsberg 100-m at 2.7 GHz (4′.3).
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×86″).
LaRosa *et al.* 2000, AJ, 119, 207. VLA at 333 MHz (43″×24″).
Bamba *et al.* 2000, PASJ, 52, 259. ASCA observations.
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (8″.4×12″.8) of part.
Bamba *et al.* 2009, ApJ, 691, 1854. Suzaku observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.

## G359.1−0.5

**RA:** $17^h45^m30^s$ **1-GHz flux/Jy:** 14 **Size/arcmin:** 24
**Dec:** –29°57′ **Spectral index:** 0.4? **Type:** S

**Radio:** Non-thermal shell in complex region, crossed by the 'snake'.
**Optical:** Detected.
**X-ray:** Centrally brightened.
**Point sources:** Several compact radio sources near centre, OH masers around edge.

**References:**


Downes *et al.* 1979, A&AS, 35, 1. From observations by Altenhoff *et al.* 1979, A&AS, 35, 23. Effelsberg 100-m at 4.9 GHz (2′.6 : $S$ = 13 Jy).
Reich & Fürst 1984, A&AS, 57, 165. Effelsberg 100-m at 2.7 GHz (4′.3 : $S$ = 10±1.5 Jy) and 4.8 GHz (2′.4 : $S$ = 8.1±0.5 Jy).
Uchida *et al.* 1992, ApJ, 398, 128. VLA at 1.5 GHz (11″×10″), and observations of nearby molecular material.
Uchida *et al.* 1992, AJ, 104, 1533. VLA at 1.4 GHz.
Gray 1994, MNRAS, 270, 835. MOST at 843 MHz (43″×85″).
Yusef-Zadeh *et al.* 1995, Science, 270, 1801. VLA at 1.4 GHz (33″×31″), and 1.7 GHz for OH survey.
LaRosa *et al.* 2000, AJ, 119, 207. VLA at 333 MHz (43″×24″).
Bamba *et al.* 2000, PASJ, 52, 259. ASCA observations.
Lazendic *et al.* 2002, MNRAS, 331, 537. Observations of shocked molecular gas where the 'snake' crosses the remnant.
Yusef-Zadeh *et al.* 2004, ApJS, 155, 421. VLA at 1.4 GHz (8″.4×12″.8).
Aharonian *et al.* 2008, A&A, 483, 509. XMM and γ-ray observations.
Hewitt *et al.* 2008, ApJ, 683, 189. GBT at 1.6 and 1.7 GHz for OH masers.
Bamba *et al.* 2009, ApJ, 691, 1854. Suzaku observations.
Stupar & Parker 2011, MNRAS, 414, 2282. Hα observations.
Ohnishi *et al.* 2011, PASJ, 63, 527. Suzaku observations.


## G359.1+0.9

**RA:** $17^h39^m36^s$ **1-GHz flux/Jy:** 2? **Size/arcmin:** 12×11
**Dec:** –29°11′ **Spectral index:** ? **Type:** S

**Radio:** Shell, brightest in E.

**References:**


Gray 1994, MNRAS, 270, 847. MOST at 843 MHz (43″×88″ : $S$=4.3 Jy).
Roy & Bhatnagar 2006, JPhCS, 54, 152. GMRT at 330 MHz (1′ : $S$=4.3±1.0 Jy).
Law *et al.* 2008, ApJS, 177, 515. VLA at 1.4 GHz (10″.9×15″.9 : $S$=1.3±0.5 Jy).