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Socorro, New Mexico
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To: Distribution

From: R. D. Ekers



Subject: VLA Discovery File

In response to a recent request, I have put together the attached list of major discoveries made with the VLA. This collection is based on a variety of notes I have kept in my personal file of major VLA results. The selection of course is subjective and the information I had available was not always complete.

I would like to update this list and try to maintain an active file of important results. I would appreciate any input, corrections and additions to this list and items which you feel are of comparable importance which are not included. I would like to include a description of at most two or three lines and a key reference for each result.

I think it would also be interesting to conduct a survey of what the NRAO Scientific Staff perceive to be the most important discoveries made with the VLA. To do so I suggest the copy you return with any corrections and suggestions also indicate your choice for the top ten most significant VLA discoveries.

RDE/tr

Attachment

Solar system

1981: Detection of Saturns rings in emission and absorpction
de Pater and Dickel, Icarus 50,p88 (1982)

1982: Detection of asteroids and measurement of diameter of Ceres
Wade & Johnston

1983: Interplanetary scintillation observations of solar wind velocity
Scintillations in the radio emission from the quasar 3C279 have been used
to measure the solar wind velocity within 3Rsun of the solar limb.
Unexpectedly rapid acceleration and extremely high anisotropy was found.
Coles et al., Conference proc, Kyoto (1984)

1986: Linear polarization measured in the rings of Saturn
Muhleman, Bengge & Grossman

1986: OH emission structure in the coma of Halleys Comet
de Pater, Palmer & Snyder, Ap.J., 304,133 (1986)

Stars

1980: Observations of evolving helical structures in SS433
provided direct measurement of proper motion velocity and distance.
Hjellming & Johnston Ap.J. 246,1141 (1981), ibid IAU Highlights (1983)

1981: Resolution of thermal emission from P Cygni
First observation of size scale of ionized stellar wind and determination
of wind temperature.

1982: Discovery of ionized cavity in wind from Antares (alpha Scorpii)
Hjellming & Newell Ap.J. 275,704 (1983)

1983: "Shadow disk" in the central HII region of the bipolar nebula S106
Bally, Snell & Predmore Ap.J. 272,154 (1983)

1983: Electron cyclotron maser discovered in UV Ceti B
Gary, Linsky & Dulk Ap. J. Lett 263,L79 (1983)

1984: Resolution of gamma 2 Velorum ionized stellar wind confirms model
Hogg in "Radio Stars" ed Hjellming & Gibson p117 (1985)

1984: Imaging of non thermal shell surrounding the old nova GK Persii 1901
showed that nova shells can induce weaker equivalents of the emission
common for supernova remnants.
Reynolds & Chevalier Ap.J.281,133 (1984)

1984: Radio continuum emission and central engine in Herbig-Haro 1 & 2
Pravdo et al Ap.J. 293,135 (1985)

1985: Evolution of the double radio lobes of Scorpius X-1
Geldzahler & Fomalont Ap.J. 311,pp85 (1986)

1985: Expanding radio jet discovered in the symbiotic star CH Cygni
Expansion velocity of 1100 km/s.
Seaquist & Taylor Can.J.Phys. 64,520 (1986)

1985: Narrow band microwave emission from red dwarf star YZ Canis Minoris
Narrow bandwidth and variability indicate a new class of coherent emission phenomena.
Lang & Wilson Ap.J 302,117 (1986)

1985: Direct measurement of asymmetric expansion of radio flare in Cyg X-3
The strong outburst in Oct 85 was resolved by the VLA indicating expansion velocities of 0.1-0.3c. Johnston

1986: First observation of frequency drift event in flare in UV Ceti
Indicates plasma emission process from regions that are rapidly changing their density environment as they move up through the atmosphere.
Bastian & Bookbinder BAAS 18,p985 (1986)

1986: Rotation and collapse in core of the compact HII region G10.6-0.4
Velocity-spatial maps of the (1,1) NH₃ inversion transition show redshifted absorption and rotation in the emission from the more extended envelope.
Ho & Haschick Ap.J. 304,p501 (1986)

Misc galactic

1984: New class of cone shaped non-thermal galactic radio sources
Shaver et al Nature 313 pp113 and Becker & Helfand Nature 313 pp115 (1985)

1985: Angular expansion measured for Planetary Nebula NGC7027
When combined with radial velocity measurements this gives a direct determination of distance.
Masson Ap.J. 302,127 (1986)

1986: Refractive interstellar scintillation in 1741-038
Hjellming & Narayan Ap.J. lett

1986: String of H₂CO masers in Sgr B2
Whiteoak & Gardner

1986: HI shell around alpha Ori
Bowers & Knapp

1987: Large He abundance gradients in HII regions
Roelfsma & Goss

Supernovae

1980: Prompt radio emission from extragalactic supernovae
Weiler, Sramek & Panagia, Science 231,pp1251 (1986)

1985: Cas A Supernovae remnant
4k x4k image with 0.2" resolution produced on the Digital productions Cray
XMP supercomputer.
Braun, Gull & Perley Nature (1987)

1986: Discovery of a powerful (Type V?) radio supernova in NGC891
Rupen, Gunn, Knapp & van Gorkom, A.J. (1987)

Galactic center

1982: Spiral shaped features in thermal emission from galactic center
Ekers, van Gorkom, Schwarz & Goss A&A 122,pp143 (1983)

1984: Large scale filamentary structure discovered in the Galactic center
Yusef-Zadeh, Morris & Chance Nature 310,pp557 (1984)

1986: Oscillation in the three arm spiral feature in Sgr A west
Yusef-Zadeh & Morris in Townes Symposium, Oct 1986.

1986: Proper motion measurements on Galactic center point source
Backer and Sramek, Townes Symposium, Oct 1986.

Normal galaxies

1981: Central spherical non-thermal source in M31
Hjellming & Smarr Ap.J. 257,113 (1982)

1981: Extragalactic OH masers in M82
Weliachev, Fomalont & Greisen A&A 137, pp335 (1984)

1982: Plumes emanating from the nuclei of edge-on galaxies
NGC3079- Duric et al., Various galaxies-Hummel et al.

1983: Population of variable radio sources in M82
Kronberg & Sramek, Science 227,pp28 (1985)

1984: Bubbles of non-thermal emission near the nucleus of M51
Ford, Crane, Jacoby, Lawrie & van der Hulst Ap.J. 293,pp132 (1985)

- 1984: HI distribution mapped in the elliptical galaxies NGC1052 & Cen A
van Gorkom, Knapp, Raimond, Faber & Gallagher A.J. 91,pp791 (1986)
van Gorkom in IAU 127, ed de Zeeuw (1987)
- 1984: Virgo cluster galaxies have small and deficient HI disks
van Gorkom, Balkowski & Kotanyi in "Clusters & Groups of Galaxies" ed
Mardirossian, pp261 (1984)
- 1985: Foreground galaxy depolarizing lobes of Fornax A
van Gorkom, Fomalont, Ebtner, Wrobel & Ekers
- 1985: Large extension of HI arm in M51
Rots, van der Hulst, Bosma, Crane, Athanasoula Science85 (Sep 1985)
- 1986: Large HI extent of Mark 348
Simkin, van Gorkom & Su Hong Jun, Science (1987)
- Radio galaxies and quasars
- 1979: Large scale bends in radio jet in 3C449
Perley, Willis & Scott, Nature 281,pp437 (1979)
- 1981: Shell structure in lobes of the radio galaxy 3C310
van Breugel & Fomalont Ap.J. 282,155
- 1982: Bands of Faraday rotation in M84
Laing & Bridle MNRAS (1987)
- 1982: Detailed observations of the radio jet in NGC6251
Perley, Bridle & Willis Ap.J.supp 54,pp291 (1984)
- 1982: Resolution of the knots in the M87 jet
Biretta, Owen & Harde Ap.J. 274,127 (1983)
- 1983: Filamentary lobe structure and jet discovered in Cygnus A
Perley, Dreher & Cowan Ap.J. 285,135 (1984)
- 1984: 3C75 in Abell 400 is found to be a binary jet radio galaxy.
Owen, O'Dea, Inoue & Eilek Ap.J. 294,185 (1985)
- 1984: Smoke rings in the radio galaxy Hercules A
Dreher & Feigelson Nature 308,pp43 (1984)
- 1985: 2nd gravitational lens discovered (0023+171)
VLA snap shot observations of 300' survey.
Hewett, Burke, Turner and Lawrence BAAS 17,pp907 (1985).

- 1985: Faraday screen in front of Cygnus A
Dreher, Carilli & Perley Ap.J. (1987)
- 1985: Symmetric helical jet in 3C436
Christiansen and Stocke AC138
- 1986: Detection of the intergalactic magnetic field in the Coma cluster
Kim, Dewdney & Landecker in "Continuum Processes in Clusters of Galaxies"
ed O'Dea & Uson (1987)
- 1986: Hot spot in Pictor A coincident with polarized optical emission
Perley & Roeser BAAS 18,pp1005 (1987)
- 1986: Second binary jet radio galaxy discovered. PKS2149-158
Cameron, Parma & de Ruiter
- 1987: 3C326.1 identified with a protogalaxy at large distance
The high redshift VLA image of 3C326.1 lead to the identification of a
possible protogalaxy at a redshift of 1.8
Spinrad, McCarthy, Djorgovski, Strauss & van Breugel