

## **CURRICULUM VITAE**

**Name** John Francis Carleton Wardle

**Citizenship** U.S.

**Birthdate** May 8, 1945: Hemel Hempstead, England

**Address** Physics Department, Brandeis University, Waltham, MA 02254

### **Education**

1966 B.A. Corpus Christi College, Cambridge, England

1967 M.Sc. University of Manchester, England\\

1969 Ph.D. University of Manchester, England\\

### **Professional Record**

1966-1969 Demonstrator in Physics, Manchester, England

1969--1972 Research Associate, NRAO

1972--1973 Instructor in Astrophysics, Brandeis University

1972 Summer Visiting Assistant Scientist, NRAO

1973--1978 Assistant Professor of Astrophysics, Brandeis University

1975 Summer Visiting Assistant Scientist, NRAO

1978--1987 Associate Professor of Astrophysics, Brandeis University

1980 Summer Visiting Scientist, Smithsonian Astrophysical Observatory

1982 Summer Visiting Scientist, Smithsonian Astrophysical Observatory

1987 -- Professor of Astrophysics, Brandeis University

1988--89 Visiting Scientist, Smithsonian Astrophysical Observatory

1991--94 Chairman, Physics Department, Brandeis University

### **Honors and Awards**

1996 John Simon Guggenheim Memorial Fellowship

### **Membership of Committees and Learned Societies**

Fellow of the Royal Astronomical Society

Member of the American Astronomical Society

Member of the American Physical Society

Member of the International Astronomical Union

Users Committee, NRAO (1975--1978)

Executive Committee, NEROC Board of Trustees (1980--)

Referee, US VLBI Network (1988--92)

## PUBLICATIONS

``Radio Emission from Quasi-Stellar Objects"

(with G. K. Miley), *Astrophys. J.* {\bf 164}, L11-13 (1971).

``The Structure and Polarization of 3C459 at 610 MHz,"

*Astrophys. Lett.* {\bf 8}, 53-55 (1971).

``The Polarization of Strong Radio Sources at 9.5 mm Wavelength,"

*Astrophys. Lett.* {\bf 8}, 193-186 (1971).

``The Structure of Double Radio Sources,"

*Astrophys. Lett.* {\bf 8}, 221-225 (1971).

``Radio Emission from the Nucleus of NGC 5128"

(with C. M. Wade, R. M. Hjellming, K.I. Kellermann), *Astrophys. J.* {\bf 170}, L119-122 (1971).

``Coordinated Observations of OJ287 at Radio and Optical Wavelengths"

(with T. D. Kinman, E. K. Conklin, B. H. Andrew, G. A. Harvey, J. M. Macleod, W. J. Medd), *Astron. J.* {\bf 79}, 349-357 (1974).

``The Radio Polarization of Quasars"

(with R. G. Conway, P. Haves, P. P. Kronberg, D. Stannard), *Mon. Not. R. Astron. Soc.* {\bf 168}, 137-162 (1974).

``The Linear Polarization of Quasi-Stellar Radio Sources at 3.71 and 11.1 Centimeters"

(with P. P. Kronberg), *Astrophys. J.*, {\bf 194}, 249-255 (1974).

``The Radio Structure of Quasars II"

(with G. K. Miley), *Astron. Astrophys.* {\bf 30}, 305-315 (1974).

``The Polarization of Normal Galaxies at Radio Wavelengths"

(with R. A. Sramek), *Astrophys. J.* {\bf 189}, 399-404 (1974).

``The Radio Properties of BL Lac Type Objects"

(with D. R. Altschuler), *Nature* {\bf 255}, 306-310 (1975).

``Observations of the Flux Density and Linear Polarization of Compact

Extragalactic Radio Sources at 3.7 and 11.1 cms Wavelength" (with D. R. Altschuler), *Mem. R. Astr. Soc.* {\bf 82}, 1-67 (1976).

``Observations of the Flux Density and Linear Polarization of Compact Extragalactic Radio Sources, II"

(with D. R. Altschuler), *Mon. Not. R. Astron. Soc.* {\bf 179}, 153-178 (1977).

- ``The Angular Size of Quasars"  
(with R. Potash), Ann. N.Y. Acad. Sci. {\bf 302}, 605-610 (1977).
- ``Further Linear Polarization Measurements of Extragalactic Radio Sources at 3.7 and 11.1 cms" (with P. P. Kronberg), Astron. J. {\bf 82}, 688-691 (1977).
- ``Upper Limits on the Faraday Rotation in Variable Radio Sources, and its Implications," Nature {\bf 269}, 563-566 (1977).
- ``The Structure of Quasars from the Region of the 5C2 Survey"  
(with R. E. Spencer), Astrophys. J. {\bf 218}, 599-604 (1977).
- ``Review of the Radio Flux and Polarization Variations in BL Lac Objects," Proc. Conf. BL Lac Objects, U. of Pittsburgh, 1978.
- ``X-Ray Emission from BL-Lacertae Objects. II. The Nature of Markarian 421"  
(with B. Margon and R. Jones), Astron. J. {\bf 83}, 1021 (1978).
- ``Observations of a Complete Sample of Quasars from the 4C Catalogue:  
Paper I, The Radio Structures"  
(with R. I. Potash), Astron. J. {\bf 84}, 707-717 (1979).
- ``4C32.69: A Quasar with a Radio Jet"  
(with R. I. Potash), Astrophys. J. {\bf 239}, 42 (1980).
- ``Variability of Extragalactic Sources at 2.7GHz. IV. Evidence for Weak Extended Emission and for Rapid Variability" (with A. H. Bridle and M. J. L. Kesteven), Astron. J. {\bf 86}, 848-853 (1981).
- ``Radio and X-Ray Observations of Large Scale Jets in Quasars"  
(with R. I. Potash), I.A.U. Symposium 97 ``Extragalactic Radio Sources," pp. 129-132, D. Reidel (1982).
- ``A New Intermediate Seyfert Galaxy: X-Ray, Optical and Radio Properties"  
(with F. D. Ghigo, S. Wyckoff and N. L. Cohen), Astron. J. {\bf 87}, 1438-1442 (1982).
- ``X-Ray Studies of Quasars with the Einstein Observatory (III): The 3CR Sample" (with H. Tananbaum, A. Zamorani and Y. Avni), Astrophys. J. {\bf 268}, 60-67 (1983).
- ``X-Ray Observations of Ring Galaxies with the Einstein Observatory"  
(with F. D. Ghigo and N. L. Cohen), Astron. J. {\bf 88}, 1587-1590 (1983).
- ``The Radio Morphology of Blazars and Relationships to Optical Polarization and to Normal Radio Galaxies" (with R. L. Moore and J. R. P. Angel), Astrophys. J. {\bf 279}, 93-111 (1984).

``Milliarcsecond Polarization Measurements''

(with D. Roberts, R. I. Potash, A. E. E. Rogers and B. F. Burke), in ``VLBI and Compact Radio Sources'' (IAU Symposium No. 110), edited by R. Fanti, K. I. Kellerman and G. Setti (D. Reidel, Dordrecht, Holland), 35-38 (1984).

``Observations of Large-Scale Jets in Quasars, and the Sidedness Problem''

(with R. I. Potash), in ``Physics of Energy Transport in Extragalactic Radio Sources'' (N.R.A.O. Workshop No. 9), edited by A. H. Bridle and J. A. Eilek, pp. 30-34 (1984).

``VLBI Polarization Studies of Quasars and AGN's''

(with D. H. Roberts), *Can. J. Phys.* **64**, 434-439 (1986).

``The Linear Polarization of 3C345 at Milliarcsecond Resolution''

(with D. H. Roberts, R. I. Potash and A. E. E. Rogers), *Astrophys. J. (Letters)*, **304**, L1-L4 (1986).

``The Polarization of Quasars and AGN's at Milliarcsecond Resolution''

(with D. H. Roberts) in ``Continuum Emission in Active Galactic Nuclei,'' Proceedings of KPNO workshop, M. L. Sitko (ed), 190-200 (Tucson AZ: National Optical Astronomy Observatories), (1986).

``Polarization Distributions in Compact Radio Sources''

(with D. H. Roberts), **Quasars**, Proceedings of IAU Symposium No. 119, G. Swarup and V. K. Kapahi (ed.), 141-147 (1986).

``Milliarcsecond Polarization of Superluminal Sources,''

in **Superluminal Radio Sources**, T. J. Pearson and J. A. Zensus (ed), (Cambridge: Cambridge U. Press), (1987).

``Polarization Structure of the BL Lacertae Object OJ287 at Milliarcsecond Resolution''

(with D. H. Roberts and D. C. Gabuzda), *Astrophys. J.* **323**, 536-542 (1987).

``Linear Polarization of Extragalactic Radio Sources at Milliarcsecond Resolution,''

(with D.H. Roberts), in *The Impact of VLBI on Astrophysics and Geophysics*, Proceedings of IAU Symposium No. 129, J.M. Moran et al., (ed.), (Dordrecht: Reidel), 143-152 (1988).

``Calculations of the Linear Polarization of Inhomogeneous Relativistic

Jets,'' (with W.K. Cobb and D.H. Roberts), in *The Impact of VLBI on Astrophysics and Geophysics*, Proceedings of IAU Symposium No. 129, J.M. Moran et al., (ed.), (Dordrecht: Reidel), 153 (1988).

- ``Polarization Structure of OJ287 at Milliarcsecond Resolution,"  
(with D.H. Roberts and D.C. Gabuzda), in *The Impact of VLBI on Astrophysics and Geophysics*, Proceedings of IAU Symposium No. 129, J.M. Moran et al., (ed.), (Dordrecht: Reidel), 159 (1988).
- ``Evolution of the Milliarcsecond Polarization Structures of the Superlunimal Sources 3C120 and 3C345," (with D.H. Roberts and L.F. Brown), in *The Impact of VLBI on Astrophysics and Geophysics*, Proceedings of IAU Symposium No. 129, J.M. Moran et al., (ed.), (Dordrecht: Reidel), 163 (1988).
- ``A Survey of the Milliarcsecond Polarization Properties of BL Lacertae Objects," (with D.C. Gabuzda, D.H. Roberts and L.F. Brown), in *The Impact of VLBI on Astrophysics and Geophysics*, Proceedings of IAU Symposium No. 129, J.M. Moran et al., (ed.), (Dordrecht: Reidel), 167 (1988).
- ``Kinematic Constraints on Models of BL Lacertae Object OJ 287 from VLBI Polarization Observations," (with T.V. Cawthorne), *Astrophys. J.* **332**, 696-701 (1988).
- ``VLBI Polarization Measurements of BL-Lacertae Objects," (with D.C. Gabuzda, T.V. Cawthorne and D.H. Roberts), in *Proceedings of Second BL Lac Workshop*, Maraschio et al., (ed.), (Springer-Verlag, Berlin), p. 22 (1989).
- ``Superluminal Motion in the BL Lacertae Object OJ 287," (with Denise C. Gabuzda and David H. Roberts), *Astrophys. J.* **336**, L59-L62 (1989).
- ``Linear Polarization Structure of the BL Lacertae Object 0735+178 at Milliarcsecond Resolution," (with D.C. Gabuzda and D.H. Roberts), *Astrophys. J.* **338**, 743-751 (1989).
- ``Global Fringe Fitting for Polarization VLBI," (with L.F. Brown and D.H. Roberts), *Astron. J.* **97**, 1522-1531 (1989).
- ``High-Dynamic-Range VLA Observations of the Quasar 3C 345," (with R.I. Kollgaard and D.H. Roberts), *Astron. J.* **97**, 1550-1555 (1989).
- ``Parsec-Scale Linear-Polarization Properties of Quasars, Galaxies and BL Lacertae Objects"  
Roberts, David H.; Wardle, John F. C.; Brown, Leslie F.; Gabuzda, Denise C.; Cawthorne, Timothy V., in "Parsec-scale radio jets," Edited by J. Anton Zensus and Timothy J. Pearson. Cambridge: Cambridge University Press, p.110 (1990)

“Linear Polarization of 3C 273 on Parsec Scales”

Wardle, John F. C.; Roberts, David H.; Brown, Leslie F.; Kollgaard, Ronald I.; Gabuzda, Denise C. in “Parsec-scale radio jets,” Edited by J. Anton Zensus and Timothy J. Pearson. Cambridge: Cambridge University Press, p.20 (1990)

“The Milliarcsecond Polarization Structure of Six BL Lacertae Objects,”

(with Denise C. Gabuzda, Timothy V. Cawthorne and David H. Roberts),  
Astrophys. J. **347**, 701-712 (1989).

“Milliarcsecond Polarization Structure of the Superluminal Quasar 3C 273,”

(with David H. Roberts, Ronald I. Kollgaard, Leslie F. Brown and Denise C. Gabuzda),  
Astrophys. J. **360**, 408-416 (1990).

“High Dynamic Range VLA Observations of Eight Core-Dominated Quasars,”

(with R.I. Kollgaard and D.H. Roberts), Astron. J. **100**, 1057-1072 (1990).

“Maximum Entropy Imaging of Polarization in Very Long Baseline Interferometry,”

(with M.A. Holdaway), in Digital Image Synthesis and Inverse Optics, (SPIE,  
Bellingham WA) 714-724 (1990).

“Linear Polarization Sensitive VLBI”

(with David H. Roberts and Leslie F. Brown), in Radio Interferometry: Theory,  
Techniques and Applications, Proceedings of IAU Colloquium 131, Socorro, NM (ASP  
San Francisco) 281-288 (1991).

“Parsec-Scale Linear Polarization Structure of Active Galactic Nuclei”

(with Leslie F. Brown and David H. Roberts) in Testing the AGN Paradigm, Proceedings  
of 2nd Annual Conference (University of Maryland, College Park, MD)  
419-422 (1992).

“A Survey of the Milliarcsecond Polarization Properties of BL Lacertae Objects at 5  
GHz,”

(with D.C. Gabuzda, T.V. Cawthorne and D.H. Roberts), Astrophys. J. **388**, 40-54  
(1992).

“Radio Constraints on the Nature of BL Lacertae Objects and Their Parent Population,”

(with R.I. Kollgaard, D. H. Roberts and D.C. Gabuzda), Astron. J. **104**, 1687-1705  
(1992).

“The Results of a Study of the Milliarcsecond Scale Linear Polarization Properties of  
Extragalactic Radio Sources”

(with T.V. Cawthorne, D.H. Roberts and D.C. Gabuzda), in Sub-Arcsecond Radio  
Astronomy, Proceedings of Jodrell Bank Conference, R.J. Davis and R.S. Booth (eds.),  
(Cambridge University Press) p. 209, (1993).

“Is 1308+326 a BL Lacertae Object or a Quasar?,”

(with D.C. Gabuzda, R.I. Kollgaard and D.H. Roberts), *Astrophys. J.* **410**, 39-43 (1993).

“Milliarcsecond Polarization Structure of 24 Objects from the Pearson-Readhead Sample of Bright Extragalactic Radio Sources. I. The Images,”

(with T.V. Cawthorne, D.H. Roberts, D.C. Gabuzda and L.F. Brown), *Astrophys. J.* **416**, 496-518 (1993).

“Milliarcsecond Polarization Structure of 24 Objects from the Pearson-Readhead Sample of Bright Extragalactic Radio Sources. II. Discussion,”

(with T.V. Cawthorne, D.H. Roberts and D.C. Gabuzda), *Astrophys. J.* **416**, 519-535 (1993).

“What You Can Learn from Polarization - Present and Future”

(with D. H. Roberts) in “Compact Extragalactic Radio Sources,” Proceedings of the NRAO workshop held at Socorro, New Mexico, February 11-12, 1994. Edited by J. Anton Zensus and Kenneth I. Kellermann. Green Bank, WV: National Radio Astronomy Observatory (NRAO), 1994., p.217

“Interpretation of VLBI Kinematic and Polarization Data: Application to 3C345”

(with D. H. Roberts) in “Compact Extragalactic Radio Sources,” Proceedings of the NRAO workshop held at Socorro, New Mexico, February 11-12, 1994. Edited by J. Anton Zensus and Kenneth I. Kellermann. Green Bank, WV: National Radio Astronomy Observatory (NRAO), 1994., p.201

“Linear Polarization Radio Imaging at Milliarcsecond Resolution,”

(with D.H. Roberts and L.F. Brown), *Astrophys. J.* **427**, 718-744 (1994).

“Unusual Evolution in the VLBI Structure of 0735+178,”

(with D.C. Gabuzda, D.H. Roberts, M.F. Aller and H.D. Aller), *Astrophys. J.* **435**, 128-139 (1994).

“Evolution of the Parsec-Scale Linear Polarization Structure of the Superluminal Quasar 3C 345,”

(with L.F. Brown and D.H. Roberts), *Astrophys. J.* **437**, 108-121 (1994).

“Evolution of the Milliarcsecond Total Intensity and Polarization Structures of BL Lacertae Objects,”

(with D.C. Gabuzda, C.M. Mullan, T.V. Cawthorne and D.H. Roberts), *Astrophys. J.* **435**, 140-161 (1994).

``Interpretation of VLBI Kinematic and Polarization Data: Application to 3C 345,"  
(with T.V. Cawthorne, D.H. Roberts and L.F. Brown), *Astrophys. J.* {\bf 437} 122-135  
(1994).

``How Fast are the Large-Scale Jets in Quasars?"  
(with S.B. Aaron) in *Energy Transport in Radio Galaxies and Quasars*, ASP Conference  
Series, Vol. 100, D. Hardee et al., (ed.), (ASP, San Francisco) p. 123-128 (1996).

“Polarization Sensitive Observations with the CMVA”  
(with Brown, L. F.; Roberts, D. H.; Phillips, R. B.; Doeleman, S. S.) in “Millimeter-VLBI  
Science Workshop,” Workshop held 22-23 November 1996 at the Massachusetts Institute  
of Technology. Edited by Richard Barvainis and Robert B. Phillips. Cambridge, MA:  
MIT, 1997, p.63

``A Multi-Frequency VLBA Polarization Study of 3C 309.1,"  
(with S.E. Aaron and D.H. Roberts), in *Vistas in Astronomy* {\bf 41}, 225-229 (1997).

``How Fast are the Large-Scale Jets in Quasars? Constraints on Both Doppler Beaming  
and Intrinsic Asymmetries,"  
(with S.E. Aaron), *Monthly Notices of the Roy. Astr. Soc.* {\bf 286}, 425-435 (1997).

“Observational Evidence against Birefringence over Cosmological Distances”  
(with Perley, R. A.; Cohen, M. H.) *Physical Review Letters*, Volume 79, Issue 10,  
September 8, 1997, pp.1801-1804

``Electron-Positron Jets Associated with the Quasar 3C 279,"  
(with D.C. Homan, R. Ojha and D.H. Roberts), *Nature* {\bf 395}, 457-461 (1998).

``Magnetic Fields in AGN,"  
in *Radio Emission from Galactic and Extragalactic Compact Sources*, ASP Conference  
Series, Vol. 144, IAU Colloquium 164, J.A. Zensus et al., (ed.), (ASP, San Francisco) 97-  
103 (1998).

``A Multi-Frequency VLBI Polarization Study of the CSS Quasar 3C 309.1,"  
(with S.E. Aaron and D.H. Roberts), in *Radio Emission from Galactic and Extragalactic  
Compact Sources*, ASP Conference Series, Vol. 144, IAU Colloquium 164, J.A. Zensus  
et al., (ed.), (ASP, San Francisco) 105-106 (1998).

``Detection of Parsec-Scale Circular Polarization with the VLBA,"  
(with D.C. Homan, R. Ojha and D.H. Roberts), in *Radio Emission from Galactic and  
Extragalactic Compact Sources*, ASP Conference Series, Vol. 144, IAU Colloquium 164,  
J.A. Zensus et al., (ed.), (ASP, San Francisco) 123-124 (1998).



``Evolution of the Parsec-Scale Structures of OJ 287 and 3C 273,"  
(with R. Ojha, D.C. Homan and D.H. Roberts), in Radio Emission from Galactic and  
Extragalactic Compact Sources, ASP Conference Series, Vol. 144, IAU Colloquium 164,  
J.A. Zensus et al., (ed.), (ASP, San Francisco) 127-128 (1998).

``VLBA Imaging of a Large Sample of Blazars,"  
(with J.M. Attridge and D.H. Roberts), in Radio Emission from Galactic and  
Extragalactic Compact Sources, ASP Conference Series, Vol. 144, IAU Colloquium 164,  
J.A. Zensus et al., (ed.), (ASP, San Francisco) 159-160 (1998).

``Thermal Material in Relativistic Jets,"  
(with A. Celotti, Z. Kuncic and M.J. Rees), Monthly Notices of the Roy. Astr. Soc. {\bf 293},  
288-298 (1998).

``The Very Long Baseline Interferometric Polarization Structure of 3C 345 at  
 $\lambda=2.8$  CM,"  
(with D.C. Gabuzda, A.J. Mioduszewski and D.H. Roberts), Monthly Notices of the Roy.  
Astr. Soc. {\bf 303}, 515-520 (1999).

``Radio Jet-Ambient Medium Interactions on Parsec Scales in the Blazar  
1055+018,"  
(with Joanne M. Attridge and David H. Roberts), Astrophys. J. {\bf 518}, L87-L90  
(1999).

``Detection and Measurement of Parsec-Scale Circular Polarization in Four AGNS,"  
(with D.C. Homan), Astrophys. J. {\bf 118}, 1942-1962 (1999).

``Direct Distance Measurements to Superluminal Radio Sources,"  
(with D.C. Homan), Astrophys. J. {\bf 535}, 575-585 (2000).

``Polarization-Sensitive VSOP Observations of Bright Quasars and  
gamma-Ray AGN,"  
(with G.A. Moellenbrock and D.H. Roberts),  
Astrophysical Phenomena Revealed by Space VLBI, Proceedings of the  
VSOP Symposium, held at the Institute of Space and Astronautical  
Science, Sagamihara, Kanagawa, Japan, January 19-21, 2000, eds. H.  
Hirabayashi, P.G. Edwards and D.W. Murphy, published by the  
Institute of Space and Astronautical Science, p. 129-132.

``Parsec-Scale Blazar Monitoring: Proper Motions,"  
(with D.C. Homan, Roopesh Ojha, David H. Roberts, Margo F. Aller, Hugh D.  
Aller and Philip A. Hughes), Astrophys. J. {\bf 549}, Issue 2, 840-861 (2001).

``Parsec-Scale Circular Polarization Observations of 40 Blazars,"  
(with D.C. Homan and Joanne M. Attridge), Astrophys. J. {\bf 556},  
Issue 1, 113-120 (2001).

“VLBA lambda lambda 6, 4 cm polarimetry of Vir A  
(with Junor, W.; Biretta, J. A) in “Galaxies and their Constituents at the Highest Angular Resolutions,” Proceedings of IAU Symposium #205, held 15-18 August 2000 at Manchester, United Kingdom. Edited by R. T. Schilizzi, 2001, p. 136.

“The nature of jets: evidence from circular polarization observations”  
(with D. C. Homan) in “Particles and Fields in Radio Galaxies” ASP Conference Proceedings Vol. 250. Edited by Robert A. Laing and Katherine M. Blundell. ISBN: 1-58381-090-0. San Francisco: Astronomical Society of the Pacific, 2001., p.152

“Making Movies from Radio Astronomical Images with AIPS”  
(with Homan, D. C.; Wardle, J. F. C.; Roberts, D. H.) eprint arXiv:astro-ph/0106427 and NRAO AIPS Memo # 106.

“Parsec-Scale Blazar Monitoring: Flux and Polarization Variability,”  
(with D.C. Homan, Roopesh Ojha, David H. Roberts, Margo F. Aller, Hugh D. Aller and Philip A. Hughes), *Astrophys. J.* **568**, Issue 1, 99-119 (2002).

“PKS 1510-089: A Head-on View of a Relativistic Jet”  
Homan, Daniel C.; Wardle, John F. C.; Cheung, Chi C.; Roberts, David H.; Attridge, Joanne M., 2002 *ApJ*...580..742

“Chandra Observations of Three SDSS Quasars at  $z \gtrsim 6$ ”  
[Schwartz, D. A.](#); [Cheung, C. C.](#); Wardle, J. F. C. in “Active Galactic Nuclei: from Central Engine to Host Galaxy,” meeting held in Meudon, France, July 23-27, 2002, Eds.: S. Collin, F. Combes and I. Shlosman. ASP (Astronomical Society of the Pacific), Conference Series, Vol. 290, p. 619.

“Studying Circular Polarization with the VLBA”  
Homan, D. C.; Wardle, J. F. C in “Radio Astronomy at the Fringe,” ASP Conference Proceedings, Vol. 300, held at National Radio Astronomy Observatory (NRAO), Green Bank, West Virginia, USA. Edited by J. Anton Zensus, Marshall H. Cohen and Eduardo Ros. San Francisco: Astronomical Society of the Pacific, ISBN: 1-58381-131-1, 2003., p.49

“Parsec-Scale Blazar Monitoring: Proper Motions and Flux and Polarization Variability”  
Roberts, D. H.; Wardle, J. F. C.; Homan, D. C.; Ojha, R.; Aller, H. D.; Aller, M. F.; Hughes, P. A. in “Future Directions in High Resolution Astronomy: A Celebration of the 10th Anniversary of the VLBA,” edited by J. D. Romney and M. J. Reid. Socorro, N.M. : National Radio Astronomy Observatory, 2003., p.13

“The Ultra-Fast Quasar PKS 1510-089: Direct Evidence for a Changing Orientation of the Central Engine”  
Wardle, John F. C.; Homan, Daniel C.; Cheung, C. C.; Roberts, David H in “Future Directions in High Resolution Astronomy: A Celebration of the 10th Anniversary of the

VLBA,” edited by J. D. Romney and M. J. Reid. Socorro, N.M. : National Radio Astronomy Observatory, 2003., p.15

“Concurrent 43 and 86 GHz VLBA Polarimetry Observations of the Quasars 3C273 and 3C279”

Attridge, J. M.; Phillips, R. B.; Wardle, J. F. C.; Homan, D. C. in “Future Directions in High Resolution Astronomy: A Celebration of the 10th Anniversary of the VLBA,” edited by J. D. Romney and M. J. Reid. Socorro, N.M. : National Radio Astronomy Observatory, 2003., p.8

“HALCA and VLBA Observations of 3C454.3”

Chen, T.; Roberts, D. H.; Wardle, J. F. C.; Cheung, C. C.; Moellenbrock, G. A in “Future Directions in High Resolution Astronomy: A Celebration of the 10th Anniversary of the VLBA,” edited by J. D. Romney and M. J. Reid. Socorro, N.M. : National Radio Astronomy Observatory, 2003., p.87

“Multi-Frequency VSOP and VLBA Polarization Observations of 3C279 and 3C345”

Cheung, C. C.; Roberts, D. H.; Wardle, J. F. C.; Moellenbrock, G. A.; Homan, D. C in “Future Directions in High Resolution Astronomy: A Celebration of the 10th Anniversary of the VLBA,” edited by J. D. Romney and M. J. Reid. Socorro, N.M. : National Radio Astronomy Observatory, 2003., p.89

“Studying Circular Polarization with the VLBA”

Wardle, John F. C.; Homan, Daniel C in “Future Directions in High Resolution Astronomy: A Celebration of the 10th Anniversary of the VLBA,” edited by J. D. Romney and M. J. Reid. Socorro, N.M. : National Radio Astronomy Observatory, 2003., p.115

“VLBA Polarimetry:A Faraday Screen in 3C273?”

Ojha, Roopesh; Wardle, John F.; Homan, Daniel C.; Roberts, David H.; Aller, Margo F.; Aller, Hugh D.; Hughes, Philip A. in “Future Directions in High Resolution Astronomy: A Celebration of the 10th Anniversary of the VLBA,” edited by J. D. Romney and M. J. Reid. Socorro, N.M. : National Radio Astronomy Observatory, 2003., p.148

“VLBA POLARIMETRY:A Faraday Screen in 3C273?”

Ojha, Roopesh; Wardle, John F.; Homan, Daniel C.; Roberts, David H.; Aller, Margo F.; Aller, Hugh D.; Hughes, Philip A. in “Quasar Cores and Jets,” 25th meeting of the IAU, Joint Discussion 18, 23-24 July 2003, Sydney, Australia

“Probing the Circular Polarization of Relativistic Jets on VLBI Scales”

Homan, Daniel C.; Wardle, John F. C. 2003 Astrophysics and Space Science, v. 288, Issue 1, p. 29-38

”Theoretical Models for Producing Circularly Polarized Radiation in Extragalactic Radio Sources”

Wardle, John F. C.; Homan, Daniel C. *Astrophysics and Space Science*, v. 288, Issue 1, p. 143-153 (2003)

“New detections of optical emission from kiloparsec-scale quasar jets”

Cheung, C. C.; Wardle, J. F. C.; Chen, Tingdong; Hariton, S. P. 2003, *New Astronomy Reviews*, Volume 47, Issue 6-7, p. 423-425

“Proper motions, flux and polarization variability from a parsec scale blazar monitoring program “

Ojha, Roopesh; Homan, Daniel C.; Wardle, John F. C.; Roberts, David H 2003, *New Astronomy Reviews*, Volume 47, Issue 6-7, p. 637-640

“Probing the polarization characteristics of SS433 on mas scales”

Paragi, Z.; Vermeulen, R. C.; Homan, D. C.; Wardle, J. F. C.; Fejes, I.; Schilizzi, R. T.; Spencer, R. E.; Stirling A. M. in “Proceedings of the 7th Symposium of the European VLBI Network on New Developments in VLBI Science and Technology.” Held in Toledo (Spain) on October 12-15 2004. Edited by R. Bachiller, F. Colomer, J.-F.; Desmurs, and P. de Vicente. (c) Observatorio Astronomico Nacional of Spain, 2004., p.221-224

“Parsec-Scale Blazar Monitoring: The Data”

Ojha, Roopesh; Homan, Daniel C.; Roberts, David H.; Wardle, John F. C.; Aller, Margo F.; Aller, Hugh D.; Hughes, Philip A. , 2004, *Astrophysical Journal Supplement Series*, Volume 150, Issue 1, pp. 187-237

“High Levels of Circularly Polarized Emission from the Radio Jet in NGC 1275 (3C 84)“

Homan, D. C.; Wardle, J. F. C. , 2004, *Astrophysical Journal*, Volume 602, Issue 1, pp. L13-L16

“Discovery of Optical Emission in the Hot Spots of Three 3CR Quasars: High-Energy Particle Acceleration in Powerful Radio Hot Spots”

Cheung, C. C.; Wardle, J. F. C.; Chen, T. 2005, *Astrophysical Journal*, Volume 628, Issue 1, pp. 104-112

“Concurrent 43 and 86 GHz Very Long Baseline Polarimetry of 3C 273”

Attridge, Joanne M.; Wardle, John F. C.; Homan, Daniel C. 2005, *Astrophysical Journal*, Volume 628, Issue 1, pp. 104-112

“Deep Chandra and Multicolor HST Follow-up of the Jets in Two Powerful Radio Quasars”

Sambruna, Rita M.; Gliozzi, Mario; Donato, Davide; Maraschi, L.; Tavecchio, F.; Cheung, C. C.; Urry, C. Megan; Wardle, J. F. C. 2006 *Astrophysical Journal*, Volume 641, Issue 2, pp. 717-731

“Deceleration from Entrainment in the Jet of the Quasar 1136-135?”  
(with Tavecchio, F.; Maraschi, L.; Sambruna, R. M.; Gliozzi, M.; Cheung, C. C.;  
Urry, C. Megan,) *Astrophysical Journal*, 641, pp. 732-739, 2006

“Large-Scale Radio and X-ray Jets in the Highest Redshift Quasars”  
(with Cheung, C. C.; Lee, N. P.) *22nd Texas Symposium on Relativistic Astrophysics*,  
Eds. P. Chen et al. (2006)