John P. Hughes

Professional History

2005 –	Professor, Rutgers University
2000 – 2005	Associate Professor, Rutgers University
1996 – 2000	Assistant Professor, Department of Physics and Astronomy, Rutgers University, New Brunswick, NJ
1988 – 1996	Staff Scientist, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA
1984 – 1987	Postdoctoral Fellow, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

Education

1984	Columbia University, Ph.D., Physics
1980	Columbia University, M.A., Physics
1978	Columbia College, A.B., Physics

Awards and Appointments

1999 – 2000	Visiting Scientist, Service d'Astrophysique, CEA-Saclay
1993	NASA Public Service Medal
1993	Visiting Research Scientist, Kyoto University, Japan
1992	NASA Group Achievement Award for *AXAF* VETA
1992	Smithsonian Institution Special Achievement Award
1991	NASA Group Achievement Award for *ROSAT*
1985	Japanese Foreign Research Fellow, The Institute of Space and Astronautical Science, Tokyo, Japan
1984 – 1996	Associate, Harvard College Observatory
1984 – 1987	Smithsonian Postdoctoral Fellow
1978 – 1980	Columbia University Faculty Fellow
1977	Summer Research Assistant, Bell Labs, Murray Hill, NJ

Professional Societies

American Physical Society
American Astronomical Society
International Astronomical Union

Professional Activities (current)

2005	Referee, ESA *XMM-Newton* AO-5 program review
since 2005	Member, *Astro-E2* Users' Committee
since 2005	Guiding Board Member, Atacama Cosmology Telescope project team
since 2004	Member, International Scientific organizing committee for "The X-ray Universe 2005" conference, El Escorial, Spain
since 2004	Collaborator, Generation-X mission concept study team
since 2003	Member, NASA/MSFC Independent Implementation Review of the

	Chandra X-ray Observatory
since 2003	Member, Deep Lens Survey project team
since 2001	Referee, Italian Space Agency
since 2000	P.I., *XMM-Newton* General Observer program, 6 investigations
since 1998	P.I., *Chandra* General Observer program, 14 investigations
since 1997	*Constellation-X Facility* science team member and chair of supernova remnant science panel
since 1995	*Astro-E* and *Astro-E2* international science working group member and co-chair of galactic diffuse emission science panel
since 1990	Referee, *Ap. J.*, *M.N.R.A.S*, *Astr. Ap.*, *Nature*, *A. J.*
since 1986	Visiting Astronomer, CTIO, La Serena, Chile

Professional Activities (past)

2004 – 2005	Member, NASA "Structure and Evolution of the Universe" (SEU) Advisory Committee
2004 – 2005	Member, NASA "Universe" Legacy Roadmap team
2003 – 2005	Member, Study team for the workshop "Physics of SNRs in the *Chandra*, *XMM-Newton* and INTEGRAL Era" International Space Science Institute (Bern, Switzerland)
2003	Member, Scientific organizing committee for the "1st Constellation-X Spectroscopy Workshop," New York, NY
2002	Referee, ESA *XMM-Newton* AO-2 program review
2001	Referee, NASA *Chandra* AO-3 program review
2001	Member, Scientific organizing committee for the workshop "Neutron Stars in Supernova Remnants (II)," Boston, MA
2000 – 2004	Member and chair (from 2002), *Chandra* Users' Committee
2000 – 2002	Member, International advisory committee for the seventh "Nuclei in the Cosmos" symposium
2000	Referee, NASA SMEX program review
1999 – 2000	Member (ex officio), US *Astro-E* Users' Committee
1999	Referee, ESA *XMM-Newton* AO-1 program review
1999	Proposal reviewer for the National Science Foundation
1999	Represented the Committee on International Space Programs at the European Science Foundation meeting (November), Granada, Spain
1998 – 2001	Member, Committee on International Space Programs, Space Studies Board, National Research Council
1998	Referee and panel chair, NASA *AXAF* AO-1 Program Review
1997	Member, Scientific organizing committee for the "*ASCA* Cherry Blossom Workshop," Washington, DC
1996	Member, Scientific organizing committee for the conference "X-ray Imaging and Spectroscopy of Cosmic Hot Plasmas," Tokyo, Japan
1996 – 2002	P.I., NASA Long Term Space Astrophysics grant
1995	Member, Nominating committee of the APS DAP
1995	Member, Scientific organizing committee for the workshop "Rates, Codes and Astrophysics," Cambridge, MA

1995	Advisor, SAO summer intern program
1994 – 1997	Member, High Throughput X-Ray Spectroscopy (HXTS) science study team (a NASA New Mission Concept study)
1994	Referee and panel chair, NASA *ASCA* AO-3 Program Review
1993 – 1998	P.I., *ASCA* Guest Observer program, 18 investigations
1993	P.I., NSF Japan Program long-term visit
1992 – 1995	Member, NASA HEAMOWG
1991 – 1995	Chair, US *Astro-D* Users' Committee
1991 – 1996	Visiting Astronomer, Whipple Observatory
1991 – 1998	P.I., *ROSAT* Guest Observer program, 19 investigations
1990	P.I., SI International exchange program grant
1989 – 1996	Visiting Astronomer, Multiple Mirror Telescope
1989, 1990	Visiting Astronomer, ESO, La Silla, Chile
1989 – 1991	Research project supervisor in Astronomy 98 and 99, Harvard University
1988	Referee, NASA *Ginga* Visiting investigator program review
1988, 1990	Referee, NASA ADP review
1988 – 1993	NSF Japanese language fellowship
1987 – 1994	P.I., NASA *Ginga* Visiting investigator program, 4 investigations
1987 – 1989	P.I., NASA Astrophysics Data Program (ADP), 2 investigations
1982 – 1984	Instructor, New York Institute of Technology, New York, NY

Research Interests

Multiwavelength studies of supernova remnants (SNRs).
Hydrodynamical models for SNR evolution.
Nonequilibrium ionization in SNR X-ray spectra.
Observational constraints on nucleosynthesis.
Mass determination in clusters of galaxies.
Sunyaev-Zel'dovich effect in clusters of galaxies.
Weak lensing

Refereed Publications

1 "A Solar Flare X-Ray Polarimeter for the Space Shuttle," J. R. Lemen, G. A. Chanan, J. P. Hughes, M. R. Laser, R. Novick, I. T. Rockwager, M. Sackson, and L. J. Tramiel, *Solar Physics*, **80**, 333–349 (1982).

2 "A Search for X-Ray Polarization from Cosmic X-Ray Sources," J. P. Hughes, K. S. Long, and R. Novick, *The Astrophysical Journal*, **280**, 255–258 (1984).

3 "Interpretation of the Number Versus Diameter Distribution for the Supernova Remnants in the Large Magellanic Cloud," J. P. Hughes, D. J. Helfand, and S. M. Kahn, *The Astrophysical Journal Letters*, **281**, L25–L28 (1984).

4 "Self-Consistent Models for the X-Ray Emission from Supernova Remnants: An Application to Kepler's Remnant," J. P. Hughes and D. J. Helfand, *The Astrophysical Journal*, **291**, 544–560 (1985).

5 "X-Ray Studies of the Supernova Remnant N132D: (I) Morphology," J. P. Hughes, *The Astrophysical Journal*, **314**, 103–110 (1987).

6 "A Redetermination of the X-Ray Spectrum of SN1006 and Excess Diffuse Emission from the Lupus Region," K. Koyama, H. Tsunemi, R. H. Becker, and J. P. Hughes, *Publ. Astron. Soc. Japan*, **39**, 437–445 (1987).

7 "Isothermality of the Gas in the Coma Cluster," J. P. Hughes, K. Yamashita, Y. Okumura, H. Tsunemi, and M. Matsuoka, *The Astrophysical Journal*, **327**, 615–626 (1988).

8 "Measurements of the Gas Temperature and Iron Abundance Distribution in the Coma Cluster," J. P. Hughes, P. Gorenstein, and D. Fabricant, *The Astrophysical Journal*, **329**, 82–96 (1988).

9 "*Tenma* Observations of the X-Ray Spectra of the Coma, Ophiuchus, and Perseus Clusters of Galaxies," Y. Okumura, H. Tsunemi, K. Yamashita, M. Matsuoka, K. Koyama, S. Hayakawa, K. Masai, and J. P. Hughes, *Publ. Astron. Soc. Japan*, **40**, 639–652 (1988).

10 "A Second Supernova Inside Puppis A," P. F. Winkler, R. P. Kirshner, J. P. Hughes, and S. Heathcote, *Nature*, **337**, 48–50 (1989).

11 "The Mass of the Coma Cluster: Combined X-Ray and Optical Results," J. P. Hughes, *The Astrophysical Journal*, **337**, 21–33 (1989).

12 "A Measurement of the Value of the Hubble Constant from the X-Ray Properties and the Sunyaev-Zel'dovich Effect of Abell 665," M. Birkinshaw, J. P. Hughes, and K. A. Arnaud, *The Astrophysical Journal*, **379**, 466–481 (1991).

13 "A2163: an Exceptionally Hot Cluster of Galaxies," M. Arnaud, J. P. Hughes, W. Forman, C. Jones, M. Lachieze-Rey, K. Yamashita, and I. Hatsukade, *The Astrophysical Journal*, **390**, 345–349 (1992).

14 "Semi-Empirical Limits on the Thermal Conductivity of Intracluster Gas," L. P. David, J. P. Hughes, and W. H. Tucker, *The Astrophysical Journal*, **394**, 452–458 (1992).

15 "The X-Ray Spectrum of Abell 665," J. P. Hughes and Y. Tanaka, *The Astrophysical Journal*, **398**, 62–68 (1992).

16 "*Ginga* Observations of the Coma Cluster and Studies of the Spatial Distribution of Iron," J. P. Hughes, J. A. Butcher, G. C. Stewart, and Y. Tanaka, *The Astrophysical Journal*, **404**, 611–619 (1993).

17 "The Insignificance of Heating Flows in Cooling Flow Clusters of Galaxies," C. R. Canizares, T. H. Markert, S. Markoff, and J. P. Hughes, *The Astrophysical Journal Letters*, **405**, L17–L20 (1993).

18 "High-Resolution X-Ray Spectroscopy of the Supernova Remnant N132D," U. Hwang, J. P. Hughes, C. R. Canizares, and T. H. Markert, *The Astrophysical Journal*, **414**, 219–229 (1993).

19 "A Measurement of the Hubble Constant from the X-Ray Properties and the Sunyaev-Zel'dovich Effect of Abell 2218," M. Birkinshaw and J. P. Hughes, *The Astrophysical Journal*, **420**, 33–43 (1994).

20 "Detection of X-rays from SN1987A with *ROSAT*," P. Gorenstein, J. P. Hughes, and W. H. Tucker, *The Astrophysical Journal Letters*, **420**, L25–L28 (1994).

21 "Elemental Abundances of the Supernova Remnant G292.0+1.8: Evidence for a Massive Progenitor," J. P. Hughes and K. P. Singh, *The Astrophysical Journal*, **422**, 126–135 (1994).

22 "Discovery of Be/X-ray Stars in Two Supernova Remnants in the Small Magellanic Cloud," J. P. Hughes and R. C. Smith, *The Astronomical Journal*, **107**, 1363–1370 (1994).

23 "A New Transient Pulsar in the Small Magellanic Cloud with an Unusual X-ray Spectrum," J. P. Hughes, *The Astrophysical Journal Letters*, **427**, L25–L28 (1994).

24 "X-Ray Spectroscopy of SNR E0102−72 with the *ASCA* Satellite," I. Hayashi, K. Koyama, M. Ozaki, E. Miyata, H. Tsunemi, J. P. Hughes, and R. Petre, *Publ. Astron. Soc. Japan*, **46**, L121–L124 (1994).

25 "Non-Polytropic Model for the Coma Cluster," R. Fusco-Femiano, and J. P. Hughes, *The Astrophysical Journal*, **429**, 545–553 (1994).

26 "Abundance Gradients in Cooling Flow Clusters: *Ginga* LAC & *Einstein* SSS Spectra of A496, A1795, A2142 & A2199," R. E. White, III, C. S. R. Day, I. Hatsukade, and J. P. Hughes, *The Astrophysical Journal*, **433**, 583–601 (1994).

27 "Evidence for Elemental Variation in the Ejecta of the Tycho Supernova Remnant," O. Vancura, P. Gorenstein, and J. P. Hughes, *The Astrophysical Journal*, **441**, 680–688 (1995).

28 "*ASCA* Observations of the Large Magellanic Cloud Supernova Remnant Sample: Typing Supernovae from Their Remnants," J. P. Hughes, I. Hayashi, D. J. Helfand, U. Hwang, M. Itoh, R. P. Kirshner, K. Koyama, T. H. Markert, H. Tsunemi, and J. Woo, *The Astrophysical Journal Letters*, **444**, L81–L84 (1995).

29 "A New X-ray–Discovered Cluster of Galaxies Associated with CL0016+16," J. P. Hughes, M. Birkinshaw, and J. P. Huchra, *The Astrophysical Journal Letters*, **448**, L93–L96 (1995).

30 "Discovery of an X-ray Synchrotron Nebula Associated with the Radio Pulsar PSR B1853+01 in the Supernova Remnant W44," I. Harrus, J. P. Hughes, and D. J. Helfand, *The Astrophysical Journal Letters*, **464**, L161–L164 (1996).

31 "A Study of the Evolutionary State of the Supernova Remnant G299.2−2.9," P. Slane, O. Vancura, and J. P. Hughes, *The Astrophysical Journal*, **465**, 840–844 (1996).

32 "*Hubble Space Telescope* Observations of Oxygen-rich Supernova Remnants in the Magellanic Clouds. I. Narrow-band Imaging of N132D in the LMC," J. A. Morse, W. P. Blair, M. A. Dopita, J. P. Hughes, R. P. Kirshner, K. S. Long, J. C. Raymond, R. S. Sutherland, and P. F. Winkler, *The Astronomical Journal*, **112**, 509–533 (1996).

33 "Detection of a Temperature Structure in the Coma Cluster of Galaxies with *ASCA*," H. Honda, M. Hirayama, M. Watanabe, H. Kunieda, Y. Tawara, K. Yamashita, T. Ohashi, J. P. Hughes, and J. P. Henry, *The Astrophysical Journal*, **473**, L71-L74 (1996).

34 "Supernova Remnants Associated with Molecular Clouds in the Large Magellanic Cloud, " K. R. Banas, J. P. Hughes, L. Bronfman, and L.-Å. Nyman, *The Astrophysical Journal*, **480**, 607–617 (1997).

35 "Interpretation of the Center-Filled X-ray Emission from the Supernova Remnant W44," I. Harrus, J. P. Hughes, K. P. Singh, K. Koyama, and I. Asaoka, *The Astrophysical Journal*, **488**, 781–791 (1997).

36 "Another X-ray–Discovered Cluster of Galaxies Associated with CL 0016+16," J. P. Hughes and M. Birkinshaw, *The Astrophysical Journal*, **497**, 645–649 (1998).

37 "The X-ray Iron Emission from Tycho's Supernova Remnant," U. Hwang, J. P. Hughes, and R. A. Petre, *The Astrophysical Journal*, **497**, 833–841 (1998).

38 "Study of the Composite Remnant MSH 11−62," I. M. Harrus, J. P. Hughes, and P. O. Slane, *The Astrophysical Journal*, **499**, 273–281 (1998).

39 "A Measurement of the Hubble Constant from the X-Ray Properties and the Sunyaev-Zel'dovich Effect of CL0016+16," J. P. Hughes and M. Birkinshaw, *The Astrophysical Journal*, **501**, 1–14 (1998).

40 "A Very Hot, High Redshift Cluster of Galaxies: More Trouble for $\Omega_0 = 1$," M. Donahue, G. M. Voit, I. Gioia, G. Luppino, J. P. Hughes, and J. T. Stocke, *The Astrophysical Journal*, **502**, 550–557 (1998).

41 "*ASCA* X-ray Spectroscopy of LMC Supernova Remnants and the Metal Abundances of the LMC," J P. Hughes, I. Hayashi, and K. Koyama, *The Astrophysical Journal*, **505**, 732–748 (1998).

42 "BVRI Light Curves for 22 Type Ia Supernovae," A. G. Riess, R. P. Kirshner, B. P. Schmidt, S. Jha, P. Challis, P. M. Garnavich, A. A. Esin, C. Carpenter, R. Grashius, R. E. Schild, P. L. Berlind, J. P. Huchra, C. F. Prosser, E. E. Falco, P. J. Benson, C. Briceño, C., W. R. Brown, N. Caldwell, I. P. Dell'Antonio, A. V. Filippenko, A. A. Goodman, N. A. Grogin, T. Groner, J. P. Hughes, P. J. Green, R. A. Jansen, J. T. Kleyna, J. X. Luu, L. M. Macri, B. A. McLeod, K. K. McLeod,

B. R. McNamara, B. McLean, A. A. E. Milone, J. J. Mohr, D. Moraru, C. Peng, J. Peters, A. H. Prestwich, K. Z. Stanek, A. Szentgyorgyi, and P. Zhao, *The Astronomical Journal*, **117**, 707–724 (1999).

43 "Nonthermal X-Ray Emission from the Shell-Type SNR G347.5−0.5," P. Slane, B. Gaensler, T. Dame, J. P. Hughes, P. P. Plucinsky, and A. Greene, *The Astrophysical Journal*, **525**, 357–367 (1999).

44 "The Extraordinarily Rapid Expansion of the X-Ray Remnant of Kepler's Supernova (SN 1604)," J. P. Hughes, *The Astrophysical Journal*, **527**, 298–309 (1999).

45 "The Second Most Distant Cluster of Galaxies in the Extended Medium Sensitivity Survey," M. Donahue, G. M. Voit, C. Scharf, I. Gioia, C. R. Mullis, J. P. Hughes, and J. T. Stocke, *The Astrophysical Journal*, **527**, 525–534 (1999).

46 "Nucleosynthesis and Mixing in Cassiopeia A," J. P. Hughes, C. E. Rakowski, D. N. Burrows, and P. O. Slane, *The Astrophysical Journal Letters*, **528**, L109–L113 (2000).

47 "The X-ray Line Emission from the Supernova Remnant W49B," U. Hwang, R. Petre, and J. P. Hughes, *The Astrophysical Journal*, **532**, 970–979 (2000).

48 "*Chandra* Observations of the Crab-Like Supernova Remnant G21.5−0.9," P. O. Slane, Y. Chen, N. Schultz, F. Seward, J. P. Hughes, and B. Gaensler, *The Astrophysical Journal Letters*, **533**, L29–L32 (2000).

49 "Sunyaev-Zel'dovich Effect Derived Distances to the High Redshift Clusters MS 0451.6−0305 and CL 0016+16," E. D. Reese, J. J. Mohr, J. E. Carlstrom, M. Joy, L. Grego, G. P. Holder, W. L. Holzapfel, J. P. Hughes, S. Patel, and M. Donahue, *The Astrophysical Journal*, **533**, 38–49 (2000).

50 "*Hubble Space Telescope* Observations of Oxygen-rich Supernova Remnants in the Magellanic Clouds. II. Elemental Abundances in N132D and 1E 0102.2-7219." W. P. Blair, J. A. Morse, J. C. Raymond, R. P. Kirshner, J. P. Hughes, M. A. Dopita, R. S. Sutherland, K. S. Long, and P. F. Winkler, *The Astrophysical Journal*, **537**, 667–689 (2000).

51 "A Merger Scenario for the Dynamics of Abell 665," P. Gómez, J. P. Hughes, and M. Birkinshaw, *The Astrophysical Journal*, **540**, 726–740 (2000).

52 "Distance and Mass of the Galaxy Cluster A1995 Derived from Sunyaev-Zel'dovich Effect and X-ray Measurements," S. K. Patel, M. Joy, J. E. Carlstrom, G. P. Holder, E. D. Reese, P. L. Gómez, J. P. Hughes, L. Grego, and W. L. Holzapfel, *The Astrophysical Journal*, **541**, 37-48 (2000).

53 "Discovery of X-ray Emission from G328.4+0.2, a Crab-Like Supernova Remnant," J. P. Hughes, P. Slane, and P. P. Plucinsky, *The Astrophysical Journal*, **542**, 386–391 (2000).

54 "Electron Heating and Cosmic Rays at a Supernova Shock from *Chandra* X-ray Observations of 1E 0102.2−7219," J. P. Hughes, C. E. Rakowski, and A. Decourchelle, *The Astrophysical Journal Letters*, **543**, L61–L65 (2000).

55 "The Expansion of the X-Ray Remnant of Tycho's Supernova (SN 1572)," J. P. Hughes, *The Astrophysical Journal Letters*, **545**, L53–L56 (2000).

56 “A Broadband X-ray Study of Supernova Remnant 3C397,” S. Safi-Harb, R. Petre, K. A. Arnaud, J. W. Keohane, K. J. Borkowski, K. K. Dyer, S. P. Reynolds, and J. P. Hughes, *The Astrophysical Journal*, **545**, 922–938 (2000).

57 “Measuring Cluster Temperature Profiles with XMM/EPIC,” M. Arnaud, D. M. Neumann, N. Aghanim, R. Gastaud, S. Majerowicz, and J. P. Hughes, *Astronomy & Astrophysics*, **365**, L80–L86 (2001).

58 “Two New Ejecta-Dominated Galactic Supernova Remnants: G337.2−0.7 and G309.2−0.6,” C. Rakowski, J. P. Hughes, and P. Slane, *The Astrophysical Journal*, **548**, 258–268 (2001).

59 “RXJ 0852.0−0462: Another Nonthermal Shell-Type SNR (G266.2−1.2),” P. Slane, J. P. Hughes, R. Edgar, P. P. Plucinsky, H. Tsunemi, E. Miyata, and B. Aschenbach, *The Astrophysical Journal*, **548**, 814–819 (2001).

60 “*ASCA* Observation of the Twin Supernova Remnants in the Large Magellanic Cloud, DEM L316,” M. Nishiuchi, J. Yokogawa, K. Koyama, and J. P. Hughes, *Publ. Astron. Soc. Japan*, **53**, 99–104 (2001).

61 “A New *ASCA* and *ROSAT* Study of the Supernova Remnant G272.2−3.2,” I. M. Harrus, P. O. Slane, Randall Smith, and J. P. Hughes, *The Astrophysical Journal*, **552**, 614–623 (2001).

62 “A Pulsar Wind Nebula in the Oxygen-Rich Supernova Remnant G292.0+1.8,” J. P. Hughes, P. O. Slane, D. N. Burrows, G. Garmire, J. A. Nousek, C. M. Olbert, and J. W. Keohane, *The Astrophysical Journal Letters*, **559**, L153–L156 (2001).

63 “An X-Ray Study of the Supernova Remnant G290.1−0.8,” P. Slane, R. Smith, J. P. Hughes, and R. Petre, *The Astrophysical Journal*, **564**, 284–290 (2002).

64 “The Structure of the Oxygen-rich Supernova Remnant G292.0+1.8 from *Chandra* X-ray Images: Shocked Ejecta and Circumstellar Medium,” S. Park, P. W. A. Roming, J. P. Hughes, P. O. Slane, D. N. Burrows, G. Garmire, and J. A. Nousek, *The Astrophysical Journal Letters*, **564**, L39–L43 (2002).

65 “*Chandra* Observations of Unresolved X-Ray Sources Around Two Clusters of Galaxies,” S. M. Molnar, J. P. Hughes, M. Donahue, and M. Joy, *The Astrophysical Journal*, **573**, L91–L94 (2002).

66 “*ASCA* Study of the High-Luminosity SNR G349.7+0.2,” P. O. Slane, Y. Chen, J. S. Lazendic, and J. P. Hughes, *The Astrophysical Journal*, **580**, 904–908 (2002).

67 “Iron Rich Ejecta in the Supernova Remnant DEM L71,” J. P. Hughes, P. Ghavamian, C. E. Rakowski, and P. O. Slane, *The Astrophysical Journal Letters*, **582**, L95–L99 (2003).

68 “The Radial Structure of Supernova Remnant N103B,” K. T. Lewis, D. N. Burrows, J. P. Hughes, P. O. Slane, G. P. Garmire, and J. A. Nousek, *The Astrophysical Journal*, **582**, 770–782 (2003).

69 “Revealing New Physical Structures in the Supernova Remnant N63A through *Chandra* Imaging Spectroscopy,” J. S. Warren, J. P. Hughes, and P. O. Slane, *The Astrophysical Journal*, **583**, 260–266 (2003).

70 "X-ray Emission from Multi-phase Shock of Supernova Remnant N49 in the Large Magellanic Cloud," S. Park, D. N. Burrows, G. Garmire, J. A. Nousek, J. P. Hughes, and R. M. Williams, *The Astrophysical Journal*, **586**, 210–223 (2003).

71 "The Physics of Supernova Remnant Blast Waves. I. Kinematics of DEM L71 in the LMC," P. Ghavamian, C. E. Rakowski, J. P. Hughes, and T. B. Williams, *The Astrophysical Journal*, **590**, 833–845 (2003).

72 "The Physics of Supernova Remnant Blast Waves. II. Electron-Ion Equilibration in DEM L71 in the LMC," C. E. Rakowski, P. Ghavamian, and J. P. Hughes, *The Astrophysical Journal*, **590**, 846–857 (2003).

73 "An X-Ray Pulsar in the Oxygen-Rich Supernova Remnant G292.0+1.8," J. P. Hughes, P. O. Slane, S. Park, P. W. A. Roming, and D. N. Burrows, *The Astrophysical Journal Letters*, **591**, L139–L142 (2003).

74 "Detection of Magnesium-Rich Ejecta in the Middle-Aged Supernova Remnant N49B," S. Park, J. P. Hughes, P. O. Slane, D. N. Burrows, J. S. Warren, G. Garmire, and J. A. Nousek, *The Astrophysical Journal Letters*, **592**, L41–L44 (2003).

75 "X-Ray Observations of the Compact Central Object in Supernova Remnant G347.3−0.5," J. S. Lazendic, P. O. Slane, B. M. Gaensler, P. P. Plucinsky, J. P. Hughes, D. K. Galloway, and F. Crawford, *The Astrophysical Journal Letters*, **593**, L27–L30 (2003).

76 "The Mass, Baryonic Fraction, and X-ray Temperature of the Luminous, High Redshift Cluster of Galaxies, MS0451.6−0305," M. Donahue, J. A. Gaskin, S. K. Patel, M. Joy, D. Clowe, and J. P. Hughes, *The Astrophysical Journal*, **598**, 190–209 (2003).

77 "0103−72.6: A New Oxygen-Rich Supernova Remnant in the Small Magellanic Cloud," S. Park, J. P. Hughes, D. N. Burrows, P. O. Slane, J. A. Nousek, and G. P. Garmire, *The Astrophysical Journal Letters*, **598**, L95–L98 (2003).

78 "X-ray Observations of the Compact Source in CTA 1," P. Slane, E. R. Zimmerman, J. P. Hughes, F. D. Seward, B. M. Gaensler, and M. E. Clarke, *The Astrophysical Journal*, **601**, 1045–1049 (2004).

79 "Nucleosynthesis in the Oxygen-Rich Supernova Remnant G292.0+1.8 from *Chandra* X-Ray Spectroscopy," S. Park, J. P. Hughes, P. O. Slane, D. N. Burrows, P. W. A. Roming, J. A. Nousek, and G. P. Garmire, *The Astrophysical Journal Letters*, **602**, L33–L36 (2004).

80 "*XMM-Newton* Observation of Kepler's Supernova Remnant," G. Cassam-Chenai, A. Decourchelle, J. Ballet, U. Hwang, J. P. Hughes, and R. Petre, *Astronomy & Astrophysics*, **414**, 545–558 (2004).

81 "A High-Resolution Study of Nonthermal Radio and X-ray Emission from SNR G347.3−0.5," J. S. Lazendic, P. O. Slane, B. M. Gaensler, P. P. Plucinsky, J. P. Hughes, and S. P. Reynolds, *The Astrophysical Journal*, **602**, 271–285 (2004).

82 "An X-ray Study of the Supernova Remnant G18.95−1.1," I. M. Harrus, P. O. Slane, J. P. Hughes, and P. Plucinsky, *The Astrophysical Journal*, **603**, 152–158 (2004).

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1998 "Understanding Plasmas in Galaxy Clusters," invited talk at the 1998 Joint APS/AAPT meeting (18–21 April, Columbus, OH).

1998 "Supernovae and their Remnants," invited talk at the 192$^{\mathrm{nd}}$ meeting of the AAS (8–11 June, San Diego, CA) (*Bull. Amer. Astr. Soc.*, **30**, 876).

1999 "Thermal X-ray Emission of Supernova Remnants: the View from *ASCA* and *ROSAT* to *Astro-E*," invited talk at the *ASCA* Symposium on "Heating and Acceleration in the Universe" (17–19 March, Tokyo, Japan).

1999 "Using Supernova Remnants in the Large Magellanic Cloud to Probe Evolution, Progenitors, and the Interstellar Medium," seminar to the Princeton ISM group, (2 April, Princeton, NJ).

1999 "U.S. Views on the *ASCA* Mission," invited review at the Workshop on U.S.-European-Japanese Cooperation in Space Research (19–21 May, Tokyo, Japan).

1999 "How the Intrinsic Shapes of Galaxy Clusters Influence Distance Determinations using the SZ Effect," invited talk at the 194$^{\mathrm{th}}$ meeting of the AAS (30 May–3 June, Chicago, IL) (*Bull. Amer. Astr. Soc.*, **31**, 915).

2000 "Nucleosynthesis and Mixing in the Supernova Remnant Cassiopeia A," seminar at Centre d'Etudes de Saclay, Service d'Astrophysique (20 January, Saclay, France).

2000 "Recent Advances in the S-Z Observations of Clusters of Galaxies," *Le Thé de la Cosmologie* seminar at Centre d'Etudes de Saclay, Service d'Astrophysique (7 March, Saclay, France).

2000 "Nucleosynthesis and Mixing in the Supernova Remnant Cassiopeia A," seminar at Osservatorio Astrofisico di Arcetri (6 April, Firenze, Italy).

2000 "*Chandra* X-ray Spectroimagery of Supernova Remnants," invited talk given at the symposium "New Vistas from X-Ray Observatories" during the 33rd COSPAR Scientific Assembly (16–23 July, Warsaw, Poland).

2000 "Young Supernova Remnants in the Magellanic Clouds," invited talk at the 11$^{\mathrm{th}}$ Annual October Maryland Astrophysics Conference "Young Supernova Remnants" (16–18 October, Greenbelt, MD).

2001 "*Chandra* Views of the Supernova Remnant/Compact Object Connection," invited talk at the 197$^{\mathrm{th}}$ meeting of the AAS (7–11 January, San Diego, CA) (*Bull. Amer. Astr. Soc.*, **32**, 1560).

2001 "Sharper Views of Magellanic Cloud Supernova Remnants," invited talk at the *Chandra* Science Symposium (16–18 July, St. Paul, MN).

2001 "*Chandra* View of Nucleosynthesis, Pulsars, Cosmic Rays and More!" colloquium to the Department of Astronomy, University of Massachusetts (1 November, Amherst, MA)

2002 "Instabilities and Cosmic Ray Acceleration in Supernova Remnants," invited talk at the 4th International Conference on High Energy Density Laboratory Astrophysics (23–25 Feb, Ann Arbor, MI).

2002 "A Tale of Two Remnants," lunchtime seminar at STScI (14 March, Baltimore, MD).

2002 "A Tale of Two Remnants: Cassiopeia A and G292.0+1.8," seminar at the NASA/GSFC Laboratory for High Energy Astrophysics (21 May, Greenbelt, MD).

2002 "X-ray Spectral Morphology of Young Supernova Remnants," invited talk given at the symposium "High Energy Studies of Supernova Remnants and Neutron Stars" during the 34th COSPAR Scientific Assembly (10–12 October, Houston, TX).

2003 "Supernova Remnants and the Interstellar Medium," invited talk given at the 201st meeting of the AAS (5–9 Jan, Seattle, WA) (*Bull. Amer. Astr. Soc.*, **34**, 1270).

2003 "Abundances from Supernova Remnants," invited talk given at the Carnegie Observatories Astrophysics Symposium 4 "Origin and Distribution of the Elements" (16–21 February, Pasadena, CA).

2003 "New Insights into Supernova Remnants from Four Years of *Chandra* Observations," invited talk given at the symposium "Four Years of *Chandra* Observations: A Tribute to Riccardo Giacconi" (16–18 September, Huntsville, AL).

2004 "Observing Nucleosynthesis in Type Ia Supernova Remnants," invited talk given at the symposium "Young Neutron Stars and Supernova Remnants" during the 35th COSPAR Scientific Assembly (18–25 July, Paris, France).

2004 "Searching for Galaxy Clusters in the Dark," seminar at the Department of Physics and Astronomy, Rutgers University (8 October, Piscataway, NJ).

2005 "New Insights into the Physics of Supernovae and their Remnants: A Comprehensive X-ray Study of SN 1572," Joint Astrophysics Colloquium, McGill University and Université de Montréal (13 September, Montréal, CA).

Abstracts

1982 "An Eigenvalue Approach to the Solution of Nonequilibrium Ionization and Applications to Models of Supernova Remnants," J. P. Hughes, *Bull. Amer. Astr. Soc.*, **14**, 666.

1983 "Kepler's Supernova Remnant – Nonequilibrium Ionization Effects," J. P. Hughes, D. J. Helfand, K. S. Long, and R. White, *Bull. Amer. Astr. Soc.*, **14**, 936.

1983 "The Number-Diameter Relationship for the Supernova Remnants in the Large Magellanic Cloud," J. P. Hughes and D. J. Helfand, *Bull. Amer. Astr. Soc.*, **15**, 668.

1984 "Nonequilibrium Ionization and the Supernova Remnants in the Large Magellanic Cloud," J. P. Hughes and D. J. Helfand, *Bull. Amer. Astr. Soc.*, **15**, 965.

1984 "Kepler's Supernova Remnant – Self-Consistent Models for the X-Ray Emission," J. P. Hughes and D. J. Helfand, *Bull. Amer. Astr. Soc.*, **16**, 466.

1985 "A Statistical Study of the Supernova Remnants in the Large Magellanic Cloud," J. P. Hughes and D. J. Helfand, *Bull. Amer. Astr. Soc.*, **16**, 927.

1985 "X-Ray Studies of the Supernova Remnant N132D," J. P. Hughes, *Bull. Amer. Astr. Soc.*, **17**, 546.

1986 "X-Ray Spectra of Supernova Remnants – A Model Independent Approach," J. P. Hughes, *Bull. Amer. Phys. Soc.*, **31**, 851.

1986 "High-Resolution X-Ray Spectroscopy of Cas A: A Nonequilibrium Interpretation," T. H. Markert, P. L. Blizzard, C. R. Canizares, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **18**, 704.

1987 "The Mass of the Coma Cluster from X-Ray Observations," J. P. Hughes, *Bull. Amer. Astr. Soc.*, **18**, 1015.

1987 "The Distribution of Dark Matter in the Coma Cluster," J. P. Hughes, *Bull. Amer. Phys. Soc.*, **32**, 1063.

1987 "Morphological Studies of the Supernova Remnant E0102.2-72.2," J. P. Hughes, R. P. Kirshner, and P. F. Winkler, *Bull. Amer. Astr. Soc.*, **19**, 730.

1988 "A Second Supernova Remnant in Puppis A ?" P. F. Winkler, R. P. Kirshner, J. P. Hughes, and S. Heathcote, *Bull. Amer. Astr. Soc.*, **20**, 671.

1988 "The Gas Content of A665," M. Birkinshaw, K. A. Arnaud, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **20**, 719.

1989 "Astronomical Image Processing with Iterative Deconvolution," P. Nisenson, C. Standley, and J. Hughes, *Bull. Amer. Astr. Soc.*, **21**, 1072.

1990 "Velocities of Galaxies in Abell 665," M. Birkinshaw, J. P. Huchra, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **22**, 882.

1991 "Abell 2218 and the Hubble Constant," M. Birkinshaw, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **23**, 973.

1991 "Elemental Abundances in the Supernova Remnant G292.0+1.8: Evidence for a Massive Progenitor," J. P. Hughes, and K. P. Singh, *Bull. Amer. Astr. Soc.*, **23**, 918.

1991 "FeLiX: An X-Ray Telescope to Perform a Medium Resolution All-Sky Survey in the 2-10 keV Band," P. Slane, M. Elvis, G. Fabbiano, J. Hughes, F. Seward, A. Szentgyorgyi, D. Worrall, *Bull. Amer. Astr. Soc.*, **23**, 1452.

1991 "X-Ray Imaging Properties of the *AXAF* Outer Mirror," E. Kellogg, R. Brissenden, J. Chappell, G. Chartas, L. Cohen, K. Flanagan, M. Freeman, D. Graessle, M. Jones, J. Hughes, P. McKinnon, D. Nguyen, W. Podgorski, J. Roll, D. Schwartz, P. Slane, H. Tananbaum, L. Van Speybroeck, A. Szentgyorgyi, P. Zhao, M. Zombeck, T. Casey, G. Matthews, M. Waldman, J. Wynn, T. Gordon, M. Magida, P. Reid, J. Bilbro, M. Joy, J. Kolodziejczak, M. Weisskopf, D. Zissa, J. Arenberg, S. Texter, *Bull. Amer. Astr. Soc.*, **23**, 1349.

1992 "*Ginga* Observation of an Oxygen-Rich Supernova Remnant," I. Asaoka, J. P. Hughes, and K. Koyama, abstract in *Frontiers of X-Ray Astronomy*, Proceedings of the

28^{th} Yamada Conference, (Universal Academy Press: Tokyo), eds. Y. Tanaka & K. Koyama, p. 385.

1992 "X-Ray Spectroscopy of SNR N132D," U. Hwang, C. R. Canizares, T. H. Markert, and J. P. Hughes, in *Frontiers of X-Ray Astronomy*, Proceedings of the 28^{th} Yamada Conference, (Universal Academy Press: Tokyo), eds. Y. Tanaka & K. Koyama, p. 389.

1992 "High Resolution X-Ray Spectroscopy of the Supernova Remnant N132D," U. Hwang, C. R. Canizares, T. H. Markert and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **24**, 790.

1992 "*ROSAT* High Spatial Resolution Observations of Kepler's Supernova Remnant," P. Slane, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **24**, 1196.

1993 "Comparative X-ray Studies of the Tycho and Cas A Supernova Remnants," O. Vancura, J. P. Hughes, and P. Gorenstein, *Bull. Amer. Astr. Soc.*, **25**, 785.

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1994 "An X-Ray Study of the Supernova Remnant W44," I. Harrus, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **26**, 1429.

1995 "The Distance to CL0016+16 and the Hubble Constant," J. P. Hughes, and M. Birkinshaw, *Bull. Amer. Astr. Soc.*, **27**, 1292.

1995 "The Association of Supernova Remnants and Molecular Clouds in the Large Magellanic Cloud," K. R. Banas, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **27**, 1395.

1995 "An X-ray Synchrotron Nebula Associated with the Radio Pulsar PSR B1853+01 in the Supernova Remnant W44," I. Harrus, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **27**, 1307.

1995 "Predicted X-ray Performance of the *AXAF* High Resolution Mirror during Ground Calibration at the Marshall Space Flight Center," D. Jerius, L. Cohen, R. Edgar, M. Freeman, T. Gaetz, J. Hughes, E. Kellogg, W. Podgorski, D. Schwartz, L. Van Speybroeck, and P. Zhao, *Bull. Amer. Astr. Soc.*, **27**, 1395.

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1995 "Ground Calibration of *AXAF*: The HRMA X-ray Detection System," B. J. Wargelin, J. P. Hughes, E. M. Kellogg, T. J. Norton, and D. A. Schwartz, *Bull. Amer. Astr. Soc.*, **27**, 1395.

1995 "*AXAF* Calibration at the XRCF," J. Z. Juda, L. P. David, R. H. Donnelly, C. Jones, B. R. McNamara, H. D. Tananbaum, H. L. Marshall, J. P. Hughes, E. M. Kellogg, B. Wargelin, J. H. Chappell, A. Kenter, R. Kraft, S. S. Murray, M. V. Zombeck,

M. W. Bautz, J. A. Nousek, D. Dewey, T. H. Markert, A. C. Brinkman, C. J. Th. Gunsing, P. Predehl, R. A. Austin, J. J. Kolodziejczak, M. C. Weisskopf, J. W. Arenberg, R. Carlson, and S. C. Texter, *Bull. Amer. Astr. Soc.*, **27**, 1394.

1996 "*Hubble Space Telescope* Observations of Oxygen-rich Supernova Remnants in the Magellanic Clouds," J. A. Morse, W. P. Blair, J. P. Hughes, R. P. Kirshner, J. C. Raymond, K. S. Long M. A. Dopita, R. S. Sutherland, P. F. Winkler, *Bull. Amer. Astr. Soc.*, **28**, 947.

1996 "The X-ray Expansion of Tycho's Supernova Remnant," J. P. Hughes, *Bull. Amer. Astr. Soc.*, **28**, 1334.

1996 "Study of the Composite Remnant MSH 11−62," I. M. Harrus, J. P. Hughes, and P. O. Slane, *Bull. Amer. Astr. Soc.*, **28**, 1334.

1997 "Fe Emission in Tycho's Supernova Remnant," U. Hwang, J. P. Hughes, R. Petre, and E. V. Gotthelf, poster presented at the Minnesota SNR Workshop "10^{51} Ergs: The Evolution of Shell SNRs," (March 23–26, Minneapolis MN).

1997 "Center-filled X-ray Morphology in SNRs," P. Slane, J. P. Hughes, R. Petre, and J.-H. Rho, poster presented at the Minnesota SNR Workshop "10^{51} Ergs: The Evolution of Shell SNRs," (March 23–26, Minneapolis MN).

1997 "Study of the Composite Remnant MSH 11−62," I. M. Harrus, J. P. Hughes, and P. Slane, poster presented at the Minnesota SNR Workshop "10^{51} Ergs: The Evolution of Shell SNRs," (March 23–26, Minneapolis MN).

1997 "Interferometric Images of the Sunyaev-Zel'dovich Effect in Galaxy Clusters from $z = 0.15$ to $z = 0.83$: toward an Independent Determination of H_0 and Omega," M. Joy, J. Carlstrom, L. Grego, W. Holzapfel, J. P. Hughes, and M. Donahue, talk given at the conference "Clusters of Galaxies at Different Redshifts," (May 28–31, Ruidoso, NM).

1997 "Systematic X-ray Spectroscopy of Supernova Remnants in the Magellanic Clouds," I. Hayashi, K. Koyama, and J. P. Hughes, poster presented at IAU Symposium No. 188, "The Hot Universe," (August 26–30, Kyoto, Japan).

1997 "*ASCA* Observation of Distant Clusters of Galaxies," T. Tsuru, H. Tomida, K. Koyama, J. P. Hughes, N. Arimoto, T. Kii, and M. Hattori, poster presented at IAU Symposium No. 188, "The Hot Universe," (August 26–30, Kyoto, Japan).

1997 "*ASCA* X-ray Spectroscopy of LMC Supernova Remnants and the Metal Abundances of the LMC," I. Hayashi, K. Koyama, and J. P. Hughes, poster presented at IAU Symposium No. 187, "Cosmic Chemical Evolution," (August 26–30, Kyoto, Japan).

1997 "Determining the Hubble Constant from the Sunyaev-Zel'dovich Effect of CL 0016+16 and MS 0451.6−0305," J. P. Hughes, J. Carlstrom, M. Joy, L. Grego, and W. Holzapfel, talk given at the High Energy Astrophysics Division meeting of the AAS, (Nov 4–7, Estes Park, CO).

1997 "To Be or Not to Be . . . Composite: An *ASCA* Study of the SNR G272.2−3.2," I. Harrus, P. Slane, and J. P. Hughes, poster presented at the High Energy Astrophysics Division meeting of the AAS, (Nov 4–7, Estes Park, CO).

1997 "Nonthermal Emission from SNR G347.5−0.5: Another Case of Cosmic Ray Acceleration?" P. Slane, P. Plucinsky, I. M. Harrus, J. P. Hughes, A. J. Green, and B. M. Gaensler, *Bull. Amer. Astr. Soc.*, **29**, 1368.

1997 "X-Ray Measurements of the Intercluster Medium and Interferometric Observations of the Sunyaev-Zel'dovich Effect in Abell 2218," S. K. Patel, M. Joy, J. E. Carlstrom, J. P. Hughes, L. Grego, W. L. Holzapfel, and A. R. Cooray, *Bull. Amer. Astr. Soc.*, **29**, 1399.

1998 "The Structure of Galaxy Clusters from Deep *ROSAT* X-ray Images," J. P. Hughes, poster presented at the conference "Highlights in X-ray Astronomy" (June 17–18, Garching, Germany).

1998 "SNRs in the LMC," J. P. Hughes, talk given at the First XMM Workshop "Science with XMM" (Sept 30–Oct 2, ESTEC, Noordwijk, The Netherlands).

1998 "New Ejecta-Dominated Young Galactic SNRs," J. P. Hughes, talk presented at the Young Supernova Remnant Workshop (Oct 11-13, Boulder, CO).

1998 "X-Ray Observations of LMC SNRs," J. P. Hughes, talk presented at the Young Supernova Remnant Workshop (Oct 11-13, Boulder, CO).

1998 "The Shapes of X-ray Galaxy Clusters: Effect on the Hubble Constant from the SZ Effect and the Distribution of Intrinsic Axial Ratios," talk given at the workshop "Cosmological Constraints from X-Ray Clusters" (Dec 9–11, Strasbourg, France).

1999 "The Dynamical State of Abell 665 and H_0," P. L. Gómez, J. P. Hughes, and M. Birkinshaw, *Bull. Amer. Astr. Soc.*, **31**, 665.

1999 "A Hubble Constant Estimate from X-ray Observations and Sunyaev-Zel'dovich Effect Measurements towards Abell 1995," S. K. Patel, M. Joy, J. E. Carlstrom, L. Grego, J. P. Hughes, E. Reese, G. Holder, and J. Mohr, *Bull. Amer. Astr. Soc.*, **31**, 700.

1999 "*ASCA* Spectroscopy of Middle-Aged LMC Supernova Remnants," M. Gagné and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **31**, 703.

1999 "Measurements of H_0 in Abell 1995 and Expected Improvements from Upcoming *Chandra* X-ray Observation," S. K. Patel, M. Joy, J. E. Carlstrom, L. Grego, J. P. Hughes, E. Reese, G. Holder, and J. Mohr, *Bull. Amer. Astr. Soc.*, **31**, 887.

1999 "Distance Estimates for High Redshifts Clusters from SZ and X-ray Measurements," M. Joy, J. E. Carlstrom, E. D. Reese, G. P. Holder, J. Mohr, S. K. Patel, L. Grego, W. L. Holzapfel, M. Donahue, J. P. Hughes, and D. Neumann, *Bull. Amer. Astr. Soc.*, **31**, 916.

1999 "A New Ejecta-Dominated Galactic Supernova Remnant," C. Rakowski, J. P. Hughes, P. Slane, and P. Plucinsky, *Bull. Amer. Astr. Soc.*, **31**, 973.

1999 "The X-ray Spectrum of the Supernova Remnant W49B," U. Hwang, R. Petre, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **31**, 974.

1999 "Imaging the Sunyaev-Zel'dovich Effect in the Galaxy Cluster MS1137+66," M. Joy, S. Patel, J. Carlstrom, G. Holder, E. Reese, L. Grego, W. Holzapfel, and J. P. Hughes, *Bull. Amer. Astr. Soc.*, **31**, 1388.

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1999 "Nucleosynthesis and Mixing in Cassiopeia A," C. E. Rakowski, J. P. Hughes, D. N. Burrows, and P. O. Slane, *Bull. Amer. Astr. Soc.*, **31**, 1433.

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