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Education

RICE UNIVERSITY, Houston, TX
Ph.D., Space Physics and Astronomy, 1995
Dissertation: *The Dynamics of Large-Scale Winds in Nearby Starburst Galaxies*
Faculty advisor: Dr. Jonathan Bland-Hawthorn / Dr. Reginald J. Dufour

M.S., Space Physics and Astronomy, 1993
Thesis: *Galactic Noise and the Distance to Centaurus A*

B.A., Physics; B.A., Computer Science, 1989
GPA 3.97 of 4.00; Summa Cum Laude

Research Experience

ASTRONOMY STAFF, Astronomy Dept., California Institute of Technology, Pasadena, CA, 2000–present
Managed the department computing facilities, including a heterogeneous network of ∼100 Unix computers, numerous PCs, associated hardware and software applications, and a staff of three persons (80%). Performed independent research in the areas of ionized gas dynamics in starburst galaxies, X-ray observations of active galactic nuclei (AGN), and imaging Fabry-Perot data analysis methods (20%).

RESEARCH ASSOCIATE, Astronomy Dept., University of Maryland, College Park, MD 1998–2000
Engaged in collaborative research projects involving X-ray observations of active galactic nuclei (AGN) from the Chandra space-borne observatory (50%). Performed independent research in the areas of galactic winds in starburst galaxies, ionized gas dynamics, and imaging Fabry-Perot data analysis methods (50%).

RESEARCH FELLOW, Astronomy Dept., California Institute of Technology, Pasadena, CA, 1995–1998
Performed independent research projects in the areas of galactic winds in starburst galaxies, diffuse ionized gas, the evolution of the ISM, and imaging Fabry-Perot data analysis methods (50%). Implemented a high-speed (ATM) network to support remote observing from California with the Keck Telescope, using NASA's ACTS satellite (35%). Provided support for instrumentation on the Palomar 60-inch and 200-inch telescopes and the LRIS instrument on the Keck Telescope (15%).

Teaching Experience

ADJUNCT PROFESSOR, Natural Sciences Dept., Prince George's Comm. College, Largo, MD, 1999
Taught introductory astronomy lecture and laboratory courses for non-science majors. Responsibilities entailed complete course organization, preparation and delivery of tri-weekly lectures, and development and grading of homework assignments and exams. Course curriculum involved a standard one-semester overview of astronomy; lab curriculum involved coordinated in-class and telescope observing projects.

INSTRUCTOR, Unix Courses, various locations, 1997–present
Taught courses in the use and administration of Unix computer systems for novice and experienced users. Responsibilities entailed course preparation, including computer demonstrations and hands-on activities, presentation of the material (over time periods of 3 hours to 2 days), and assessment and follow-up interactions.

INSTRUCTOR ASSISTANT, Physics Dept., Rice University, Houston, TX, 1986–1993
Assisted in teaching introductory physics courses for non-science majors and associated laboratories. Responsibilities entailed weekly lecturing and grading for small (25 students) tutorial classes. Curriculum involved a two-semester course, covering the topics of mechanics, thermodynamics, E&M, optics, and relativity.

MENTOR, NSF Teacher Training Program, Houston, TX, Summer 1990–1992
Trained groups of K-12 teachers in techniques of astronomical research, including stellar, nebular, and extragalactic programs. Responsibilities entailed trips to the observatory, literature research, and one-on-one instruction. Equipment included a 36-inch telescope, an automated 14-inch telescope, a spectrograph, and CCDs.

Related Experience

CONSULTANT, Private computer systems consulting, 1993–present
Numerous consulting contracts for the installation and administration of Unix and PC systems running a variety of scientific data analysis and web-oriented software packages. Provide support and training to users, both on-location and remotely. Clients include South Carolina State University, Lockheed Martin Corporation, and NASA.

SYSTEMS ADMINISTRATOR, Space Physics & Astronomy Dept., Rice University, Houston, TX, 1990–1995
Responsible for the installation and maintenance of hardware and software on a heterogeneous network of Unix workstations and personal computers. Provide support for operating system and scientific software packages.

SOFTWARE DEVELOPER, National Optical Astronomy Observatory (NOAO), Tucson, AZ, Fall 1992
Designed and began implementation of an IRAF package for the analysis of imaging Fabry-Perot data.

SOFTWARE DEVELOPER, National Radio Astronomy Observatory (NRAO), Tucson, AZ, Summer 1988,1989
Implemented the user interface and intermediate control software for a 2 GHz radio telescope receiver.

Computer Experience

System administration:	10 years experience with Unix, Windows NT, Macintosh, and PC systems
Operating systems:	Unix (Solaris, Linux, OSF/1, AIX), Windows NT, Mac OS, DOS
Languages:	C, FORTRAN, HTML, Pascal, Sh/awk, SPP, TEX, C++, Perl, Tcl/Tk
Hardware:	Sun, Macintosh, PC, Digital, IBM, HP, SGI

Telescope Experience

Keck Observatory/10-meter:	4 half-nights; LRIS imaging spectrograph; 1996–1998
Palomar Observatory/200-inch:	10 nights; double spectrograph, Fabry-Perot, COSMIC camera; 1995–1998
Palomar Observatory/60-inch:	25 nights; Fabry-Perot, CCD camera; 1995–1999
AAO/4-meter:	4 nights; Fabry-Perot; 1994
George Observatory/36-inch:	$\sim$40 nights; CCD camera, spectrograph; 1990–1995
George Observatory/14-inch:	$\sim$50 nights; eyepiece, CCD camera, solar filter; 1990–1995
Celestron/8-inch/11-inch:	$>$100 nights; eyepiece, CCD camera, solar filter; 1986–1998

Grants and Awards

Professional

STScI Research Grant ($41k), 1999–2001
STScI Research Grant ($27k), 1997–1999

Graduate

Sigma Xi Research Grant, 1993–1994
Texas Space Grant Consortium Fellowship, 1991–1992, 1993–1994
Who's Who Among Students in American Universities and Colleges 1994–1995
Marlar Award for Excellence in Research, 1991
William & Elva Gordon Fellowship, 1989–1990

Professional Associations

American Astronomical Society
Astronomical Society of the Pacific
IAU Working Group on Sky Surveys
Sigma Xi

Publications

Refereed

The Starburst-Interstellar Medium Interaction in NGC 1569. II. The Detailed Ionization Structure from Hubble Space Telescope WFPC2 Imagery, 2001, Shopbell, P.L., Buckalew, B.A., Dufour, R.J., and Walter, D.K., *Astron. J.*, in preparation.

Detection and Measurement from Narrowband Tunable Filter Scans, 2001, Jones, D.H., Shopbell, P.L., and Bland-Hawthorn, J., *Mon. Not. Roy. Ast. Soc.*, submitted.

The Biconical Outflow in the Seyfert Galaxy NGC 2992, 2001, Veilleux, S., Shopbell, P.L., and Miller, S.T., *Astron. J.*, 121.

Chandra X-ray Observations of Pictor A: High Energy Cosmic Rays in a Radio Galaxy, 2001, Wilson, A.S., Young, A.J., and Shopbell, P.L., *Astrophys. J.*, 546.

The Starburst-Interstellar Medium Interaction in NGC 1569. I. Location and Nature of He II Sources Using Hubble Space Telescope WFPC2 Imagery, 2000, Buckalew, B.A., Dufour, R.J., Shopbell, P.L., and Walter, D.K., *Astron. J.*, 120, 2402.

Chandra Observations of Cygnus A: Magnetic Field Strengths in the Hot Spots of a Radio Galaxy, 2000, Wilson, A.S., Young, A.J., and Shopbell, P.L., *Astrophys. J. (Letters)*, 544, L27.

Hubble Space Telescope Imaging of the Circinus Galaxy, 2000, Wilson, A.S., Shopbell, P.L., Simpson, S., Storchi-Bergmann, T., Barbosa, F.K.B., and Ward, M.J., *Astron. J.*, 120, 1325.

Caltech Faint Galaxy Redshift Survey X: A Redshift Survey in the Region of the Hubble Deep Field North, 2000, Cohen, J.G., Hogg, D.W., Blandford, R., Cowie, L.L., Hu, E., Songaila, A., Shopbell, P.L., and Richberg, K., *Astrophys. J.*, 538, 29.

The Very Extended Ionized Nebula around the Quasar MR2251-178, 1999, Shopbell, P.L., Veilleux, S., and Bland-Hawthorn, J., *Astrophys. J. (Letters)*, 524, L83.

Caltech Faint Galaxy Redshift Survey VIII: Analysis of the Field J0053+1234, 1999, Cohen, J.G., Blandford, R., Hogg, D.W., Pahre, M.A., and Shopbell, P.L., *Astrophys. J.*, 512, 30.

Caltech Faint Galaxy Redshift Survey VII: Data Analysis Techniques and Redshifts in the Field J0053+1234, 1999, Cohen, J.G., Hogg, D.W., Pahre, M.A., Blandford, R., Shopbell, P.L., and Richberg, K., *Astrophys. J. Supp.*, 120, 171.

The Asymmetric Wind in M82, 1998, Shopbell, P.L. and Bland-Hawthorn, J., *Astrophys. J.*, 493, 129.

The Dynamics of Large-Scale Winds in Nearby Starburst Galaxies, 1996, Shopbell, P.L., *Pub. Ast. Soc. Pac.*, 108, 725.

Redshift Clustering in the Hubble Deep Field, 1996, Cohen, J.G., Cowie, L.L., Hogg, D.W., Songaila, A., Blandford, R., Hu, E.M., and Shopbell, P., *Astrophys. J. (Letters)*, 471, L5.

A Search for Diffuse Hα Emission from Lyα Absorption Clouds Toward 3C 273, 1994, Bland-Hawthorn, J., Taylor, K., Veilleux, S., and Shopbell, P.L., *Astrophys. J. (Letters)*, 437, L95.

Energetic Outflows in Luminous Infrared Galaxies, 1993, Shopbell, P.L. and Bland-Hawthorn, J., *Rev. Mex. Astron. y Astrofis.*, 27, 191.

Deep Sky Surveys: A Motivation for Stacking Digitized Photographic Plates, 1993, Bland-Hawthorn, J., Shopbell, P.L., and Malin, D.F., *Astron. J.*, 106, 2154.

Surface Brightness Fluctuations in NGC 5128 from Wide-Field Photographic Plates, 1993, Shopbell, P.L., Bland-Hawthorn, J., and Malin, D.F., *Astron. J.*, 106, 1344.

Non-Refereed

Chandra X-ray Observations of Cygnus A and Pictor A, 2001, Wilson, A.S., Young, A.J., and Shopbell, P.L. To appear in *Particles and Fields in Radio Galaxies*, A.S.P. Conf. Ser.

HST Observations of the Starburst-ISM Interaction in NGC 1569, 2001, Shopbell, P.L., Buckalew, B.,A., Dufour, R.J. and Walter, D.K., *BAAS*, 197, #78.14.

A Japan-U.S. Educational Collaboration: Using the Telescopes in Education (TIE) Program via Intelsat, 2000, Shopbell, P.L., Hsu, E., Kadowaki, N., Clark, G., *et al.*. To appear in *Astronomical Data Analysis Software and Systems X*, A.S.P. Conf. Ser.

Chandra Observations of Nearby, Luminous Radio Galaxies, 2000, Wilson, A.S., Young, A.J., and Shopbell, P.L., *HEAD Meeting*, 32, #08.02.

Chandra Observations of NGC 1068, 2000, Young, A.J., Wilson, A.S., Shopbell, P.L., and Smith, D.A., *HEAD Meeting*, 32, #04.09.

High-Resolution HST Imagery of the Ionized Gas in NGC 1569, 1999, Shopbell, P.L., Buckalew, B.,A., Dufour, R.J. and Walter, D.K., *BAAS*, 195, #08.07.

A Very Extended Ionized Nebula around the Quasar MR2251-178, 1999, Shopbell, P.L., Veilleux, S., and Bland-Hawthorn, J. In *Imaging the Universe in Three Dimensions: Astrophysics with Advanced Multi-Wavelength Imaging Devices*, A.S.P. Conf. Ser. Vol. 195, eds. W. van Breugel and J. Bland-Hawthorn, 404–407.

Extended Ionized Gas in the Quasar MR2551-178, 1999, Shopbell, P.L. and Veilleux, S., *AAO Newsletter*, 88, 6.

The Extremely Red Objects Found Thus Far in the Caltech Faint Galaxy Redshift Survey, 1998, Cohen, J.G., Hogg, D.W., Blandford, R., Pahre, M.A., and Shopbell, P.L. In *Astrophysics with Infrared Surveys: A Prelude to SIRTF*, A.S.P. Conf. Ser. Vol. 177, eds. M. D. Bicay, C. A. Beichman, R. M. Cutri, and B. F. Madore, 47–50.

Kinematics of I Zwicky 18 and Companion Galaxy, 1998, Dufour, R.J. and Shopbell, P.L., *BAAS*, 192, #69.06.

Optical, IR, and Radio Follow-Up Studies of GRBs, 1998, Djorgovski, S.G., Kulkarni, S.R., Frail, D.A., Bloom, J.S., Odewahn, S.C., Shopbell, P.L., Adelberger, K.L., Gal, R.R., Vakil, D., Ramaprakash, A.N., and Goodrich, R., *BAAS*, 192, #33.10.

The Excitation of the Galactic Wind in M82: HST and Keck Observations, 1998, Shopbell, P.L., Cohen, J.G., Bland-Hawthorn, J., and Dufour, R.J., *BAAS*, 191, #129.12.

Remote Observing with the Keck Telescope: ATM Networks and Satellite Systems, 1998, Shopbell, P.L., Cohen, J.G., and Bergman, L. In *Astronomical Data Analysis Software and Systems VII*, A.S.P. Conf. Ser. Vol. 145, eds. R. Albrecht, R. Hook, and H. Bushouse, 348–351.

Remote Observing with the Keck Telescope from California Using NASA's ACTS Satellite, 1997, Shopbell, P.L., Cohen, J.G., and Bergman, L. In *Telescope Control Systems II*, SPIE Vol. 3112, ed. H. Lewis, 209–220.

Goodness, Gracious, Great Balls of Fire, 1997, Naeye, R., *Astronomy*, Vol. 25, No. 4, 50.

Three-dimensional Data Analysis in IRAF and ZODIAC+, 1997, Shopbell, P.L. In *Astronomical Data Analysis Software and Systems VI*, A.S.P. Conf. Ser. Vol. 125, eds. G. Hunt and H.E. Payne, 66–68.

FPTOOL: A GUI for the Analysis of Fabry-Perot Data in IRAF, 1996, Shopbell, P.L. and Bland-Hawthorn, J. In *Astronomical Data Analysis Software and Systems V*, A.S.P. Conf. Ser. Vol. 101, eds. G. Jacoby and J. Barnes, 116–119.

A High Speed Network for Remote Observing from Caltech with the Keck Telescope, 1996, Cohen, J.G., Bergman, L., and Shopbell, P.L. In *Astronomical Data Analysis Software and Systems V*, A.S.P. Conf. Ser. Vol. 101, eds. G. Jacoby and J. Barnes, 376–379.

Dynamics of the Large-Scale Wind in M82, 1995, Shopbell, P.L. and Bland-Hawthorn, J., *BAAS*, 187, #24.01.

Automated Spectral Reduction in the IRAF Fabry-Perot Package, 1995, Shopbell, P.L. and Bland-Hawthorn, J. In *Astronomical Data Analysis Software and Systems IV*, A.S.P. Conf. Ser. Vol. 77, eds. R.A. Shaw, H.E. Payne, and J.J.E. Hayes, 510–513.

A Test for Weak Cosmic Ray Events on CCD Exposures, 1995, Bland-Hawthorn, J., Serjeant, S., and Shopbell, P.L. In *Astronomical Data Analysis Software and Systems IV*, A.S.P. Conf. Ser. Vol. 77, eds. R.A. Shaw, H.E. Payne, and J.J.E. Hayes, 507–509.

Towards a General Definition for Spectroscopic Resolution, 1995, Jones, A.W., Bland-Hawthorn, J., and Shopbell, P.L. In *Astronomical Data Analysis Software and Systems IV*, A.S.P. Conf. Ser. Vol. 77, eds. R.A. Shaw, H.E. Payne, and J.J.E. Hayes, 503–506.

Dissecting Cosmic Explosions, 1995, Tully, B., Morse, J., and Shopbell, P., *Sky & Telescope*, 90, 18.

The Dynamics of the Large-Scale Wind in M82, 1994, Shopbell, P.L. and Bland-Hawthorn, J., *BAAS*, 185, #75.09.

The IRAF Fabry-Perot Analysis Package: The Incomplete Phase Surface, 1993, Shopbell, P., Bland-Hawthorn, J., and Cecil, G. In *Astronomical Data Analysis Software and Systems II*, A.S.P. Conf. Ser. Vol. 52, eds. R.J. Hanisch, R.J.V. Brissenden, and J. Barnes, 447–451.

A Technique for Stacking Digitized Photographic Plates, 1993, Bland-Hawthorn, J. and Shopbell P.L. In *Astronomical Data Analysis Software and Systems II*, A.S.P. Conf. Ser. Vol. 52, eds. R.J. Hanisch, R.J.V. Brissenden, and J. Barnes, 398–402.

A Technique for Stacking Wide-Field Photographic Plates, 1993, Bland-Hawthorn, J. and Shopbell, P.L. In *IAU Working Group on Wide-Field Imaging*, Vol. 3, 52.

The Development of an Imaging Fabry-Perot Reduction System within IRAF, 1992, Bland-Hawthorn, J., Shopbell, P. and Cecil, G. In *Astronomical Data Analysis Software and Systems I*, A.S.P. Conf. Ser. Vol. 25, eds. D.M. Worrall, C. Biemesderfer, and J. Barnes, 393–397.

The Theory and Application of Fabry-Perot Phase Correction within IRAF, 1992, Shopbell, P., Bland-Hawthorn, J., and Cecil, G. In *Astronomical Data Analysis Software and Systems I*, A.S.P. Conf. Ser. Vol. 25, eds. D.M. Worrall, C. Biemesderfer, and J. Barnes, 442–444.

The Development of an IRAF Fabry-Perot Reduction System, 1991, Shopbell, P.L., Bland-Hawthorn, J., and Cecil, G., *BAAS*, 179, #65.05.

Reports and Manuals

Palomar Fabry-Perot User's Manual, 1998, Shopbell, P.L., and Vogel, S.N. Palomar Observatory document.

Zodiac+ User's Manual, 2nd Edition, 1998, Shopbell, P.L. Zodiac+ data reduction system documentation.

Remote Observing with the Keck Telescope Using the ACTS Satellite, 1998, Cohen, J.G., Shopbell, P.L., and Bergman, L. Final Report for NASA Grant #BK-509-20-42-00-00

HPCC FY97 Final Report: Keck/ACTS, 1997, Shopbell, P.L., Bergman, L., and Cohen, J.G. Final report for the NASA High-Performance Computing Center fiscal year 1997.

A Test for Electrical Interference in LRIS, 1997, Cohen, J.G., and Shopbell, P.L. Keck Observatory document.

The Slitmask Astrometry of the LRIS, 1996, Cohen, J.G., and Shopbell, P.L. Keck Observatory document.

The Spatial Distortion in the LRIS - Addendum 5, 1996, Cohen, J.G., and Shopbell, P.L. Keck Observatory document.

LRIS Flexure at the Zenith with the New Keck II Instrument Module, 1996, Cohen, J.G., and Shopbell, P.L. Keck Observatory document.

Selected Presentations

Observations of Active Galaxies with the Chandra X-ray Observatory, Oct. 2000, Physics & Astronomy Department Colloquium, Rice University, Houston, TX.

Keck, CELT, and the Quest for a 100-meter Optical Telescope, Oct. 2000, Physics & Astronomy Department Astronomical Unit, Rice University, Houston, TX.

The Chandra X-ray Observatory, Jul. 1999, Summer Student Research Program, South Carolina State University, Orangeburg, SC.

A Fabry-Perot Instrument Primer, Apr. 1999, Journal Club, University of Maryland, College Park, MD.

The Search for Extragalactic Ionized Gas, Apr. 1999, Astronomy Department Colloquium, University of Maryland, College Park, MD.

The Chandra X-ray Observatory, Mar. 1999, Alumni Reunion Conference, Rice University, Houston, TX.

IRAF and SAOtng: Pushing the Limits, Feb. 1998, ADPF Users Group meeting, Caltech, Pasadena, CA.

Galaxies: Building Blocks of the Universe, Jul. 1997, Symposium, Tanner Research Inc., Pasadena, CA.

The Surface Brightness Fluctuation Survey, Jan. 1997, Journal Club, Caltech, Pasadena, CA.

The Dynamics of the Galactic Wind in M82, Oct. 1996, BIMA Seminar, University of Maryland, College Park, MD.

The Dynamics of Large-Scale Winds in M82, Mar. 1996, Observatorio Astronómico Nacional, UNAM, Ensenada, Mexico.

Observing with the Keck Telescopes, Jan. 1996, Space Physics & Astronomy Dept. Colloquium, Rice University, Houston, TX.

The Dynamics of the Galactic Wind in M82, Oct. 1995, Astronomy Dept. Teatalk, Caltech, Pasadena, CA.

Computer Users Group, 1993–1995, numerous informal computer-related presentations to the Space Physics & Astronomy Dept., Rice University, Houston, TX. Sample topics: *An Introduction to Unix*; *Mathematica*; *IRAF for Beginners*.

M82: An Exploding Galaxy or a Galaxy Moving through Dust?, 1994, Anglo Australian Observatory Seminar, Epping, NSW.

Galaxies and their Interactions, Oct. 1993, at *Astronomy Day 1993*, Houston, TX.

K-12 school presentations, 1992–1995, numerous classroom presentations to students in elementary and secondary schools, Houston, TX.

Galaxy Morphology, Nov. 1992, at *Astronomy Day 1992*, Houston, TX.

Astronomical Unit, 1989–1995, numerous informal scientific presentations to the Space Physics & Astronomy Dept., Rice University, Houston, TX. Sample topics: *The Distance to Centaurus A: Photography in Modern Astronomy*; *Power Networking for Astronomers*; *The Starburst-Outflow Connection in Galaxies*.