FRANCES BAGENAL
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University of Colorado
Boulder CO 80309-0392

PERSONAL DATA

Born: November 4, 1954 Dorchester, England
Naturalized US citizen (9/6/2001)

EDUCATION

1973-1976 University of Lancaster, BSc in Physics and Geophysics
1976-1981 Massachusetts Institute of Technology, Ph.D. in Earth and Planetary Sciences.

APPOINTMENTS

June 1, 2015 Research Associate IV, Laboratory for Space and Atmospheric Physics
1992-2015 Research Associate III, Laboratory for Space and Atmospheric Physics
1999-2015 Professor, Department of Astrophysical and Planetary Sciences, University of Colorado, Boulder
1995-1996, 1997-2001, 2005-2006, 2009-2010 Associate Chair, Department of Astrophysical and Planetary Sciences
1993-1999 Associate Professor, APS Dept., University of Colorado, Boulder
1989-1993 Assistant Professor, APS Dept., University of Colorado, Boulder
1987-1988 Visiting Scientist, High Altitude Observatory, National Center for Atmospheric Research
1985-1987 Science and Engineering Research Council Advanced Research Fellow, Space Physics Group, Imperial College, London
1982-1985 Post-Doctoral Research Assistant, Space Physics Group, Imperial College
1981-1982 Post-Doctoral Research Assistant, MIT, Center for Space Research
1977-1981 Research Assistant, Center for Space Research, MIT

AWARDS

2018 James Van Allen Lecture award, American Geophysical Union
2010 Boulder Faculty Assembly's Excellence in Research Award
2006 Fellow of the American Geophysical Union
NASA Group Achievement Awards for contributions to the *Voyager*, *Galileo*, *Deep Space 1*, *New Horizons* and *Juno* missions.
2000, 2003 President's Faculty Excellence Award for Advancing Teaching and Learning through Technology, University of Colorado, Boulder

PROFESSIONAL ACTIVITIES AND SOCIETIES (past 20 years)

2016- Standing Review Board, NASA Europa Clipper mission
2009 - 2010 Chair of the Planetary Science Subcommittee of the Science Committee of the NASA Advisory Council
2004 - 2009 Chair, NASA's Outer Planet's Assessment Group
2004 - 2010 Editor, STATUS, newsletter of the Committee on the Status of Women in Astronomy of the American Astronomical Society
2005 - 2008 Astronomy Education Board, American Astronomical Society
2004 - 2007 Member, Committee of the Division of Planetary Science of the American Astronomical Society
2001 - 2002 Member Solar and Space Physics Decadal Survey Committee for the National Research Council / National Academy of Sciences
1998 - 2001 Member of the Space Studies Board for the National Research Council / National Academy of Sciences

RESEARCH

Jupiter is a planet of superlatives: the most massive planet in the solar system, rotates the fastest, has the strongest magnetic field, and has the most massive satellite system. The Galilean moons are four very different worlds: crater-covered Callisto, the mini-magnetosphere of Ganymede, the cracked, icy world of Europa and volcanic Io. The strong magnetic field of Jupiter traps a torus of ionized gases stripped from the volcanic atmosphere of the moon Io. Aurora are excited when accelerated particles bombard Jupiter's atmosphere. Before the Cassini mission, the magnetosphere of Saturn was thought to be smaller, weaker, and less interesting than Jupiter. But the discovery of water jetting out of cracks on the surface of the small moon Enceladus and a persistent puzzle about the planet's spin rate have shown the magnetosphere of Saturn to be just as interesting – but different. Gases from Saturn's moon Enceladus surround the planet but remain largely neutral. The smaller plasma source and weaker magnetic field of Saturn result in a smaller, less dynamic magnetosphere. I enjoy studying the environs of planets dominated by their magnetic fields – magnetospheres – because the systems are dynamic, involve a wide range of physical phenomena, and each new space mission seems to bring surprises. I study the magnetospheres of the outer planets by combining data analysis and theoretical models.

NASA MISSIONS

Voyager: 1977-1989. Co-I on the Plasma Science (PLS) instrument. Worked with PLS data at Jupiter, Saturn, Uranus & Neptune. Concentrated on plasma between 5 and 30 R_J at Jupiter.

Galileo: 1992-2003. Interdisciplinary Scientist. Concentrated on Plasma Science (PLS), Plasma Wave Science (PWS) data and plasma between 5 and 30 R_J at Jupiter.

Deep Space 1: 1997-2001. Team member of PEPE (PI. Dave Young). Analysis of data obtained on the interaction of the solar wind with the Comet Borrelly.

Cassini: While not officially involved in the Cassini Project, I have worked with Cassini plasma data (CAPS, PI Dave Young) and the UVIS data (PI Larry Esposito). The combination of data obtained on the Jupiter flyby, UVIS observations of the Io plasma torus emissions, Galileo in situ data and physical chemistry models have proven to be particularly productive.

New Horizons: 2001-2016. Co-I and Particles Theme Lead. Analysis of data obtained on the interaction of the solar wind with the Pluto system.

Juno: 2003-2019. Co-I and Co-Chair of the Magnetospheres Working Group and the Science Planning Working Group. Study of magnetospheric plasmasheet and coupling to Jupiter's atmosphere.

STUDENTS

Graduated PhDs: Sarah Gibson, Frank Crary, Chris Balch, David Brain, Andrew Steffl, Licia Ray, Vincent Dols, Bobby Fleshman, Mariel Desroche.

Current graduate students: Drake Ranquist, Edward Nerney

Undergraduate students: Currently we have 3 undergraduate students in the MOP group.

GROUP

Fran Bagenal heads the Magnetospheres of the Outer Planets group within LASP comprising herself, Research Scientists Rob Wilson, Frank Crary and Vincent Dols, two graduate and three undergraduate students. Professors Bob Ergun, David Brain and Nick Schneider are also affiliated with the MOP group as are LASP Research Scientists Laila Andersson, Bill Peterson, Stephan Erickson, Karlheinz Trattner, Rick Wilder, and David Malispina.

SELECTED BOOKS & BOOK CHAPTERS (27 total)

Planetary Magnetospheres and the Interplanetary Medium, J.A. Van Allen, F. **Bagenal**, in *The New Solar System* (4th edition), Eds.J. Kelly Beatty, Carolyn Collins Petersen, Andrew Chaikin, Cambridge University Press & Sky Publishing, 1998

Jupiter: Planet, Satellites, Magnetosphere, eds. **Bagenal**, Dowling, McKinnon, Cambridge University Press, 2004

Comparative Planetary Environments, F. **Bagenal**, in *Heliophysics: Plasma Physics of the Local Cosmos*, C.J. Schrijver, G.L. Siscoe (eds), Cambridge University Press, 2009

Planetary Magnetospheres, F. **Bagenal**, in *Planets, Stars and Stellar Systems. Volume 3: Solar and Stellar Planetary Systems,* T.D. Oswalt, L. French, P. Kalas (eds.), Springer, 2013

Planetary Magnetospheres, M.G. Kivelson, F. **Bagenal**, Encyclopedia of the Solar System, Third Edition by D. Breuer, T. Johnson, T. Spohn, 2014

Jupiter, F. **Bagenal**, *Discoveries in Modern Science: Exploration, Invention, Technology*. Ed. James Trefil. Farmington Hills: Macmillan, 2015

Heliophysics: Active stars, their astrospheres and impacts on planetary environments, Vol IV, Eds. C.J. Schrijver, F. **Bagenal**, J.J. Sojka, Cambridge University Press, 2016

SELECTED JOURNAL PUBLICATIONS (167 total)

Direct plasma measurements in the Io torus and inner magnetosphere of Jupiter, F. **Bagenal** & J.D. Sullivan, *J. Geophys. Res. 86*, 8447, 1981

Empirical model of the Io plasma torus: I Voyager measurements, F. **Bagenal**, *J. Geophys. Res., 99,* 11043-11062, 1994

The ionization source near Io from Galileo wake data, F. **Bagenal**, *Geophys. Res. Lett., 24* , 2111-4, 1997

Cassini UVIS observations of the Io plasma torus. I. Initial results, A. J. Steffl, A. I. F. Stewart and F. **Bagenal**, *Icarus, 172*, 78-90, 2004

Cassini UVIS Observations of the Io Plasma Torus: II. Radial Variations, A. J. Steffl, F. **Bagenal**, A. I. F. Stewart, *Icarus, 172,* 91-103, 2004

Modeling temporal variability of plasma conditions in the Io torus during the Cassini era, P. A. Delamere, A. Steffl, and F. **Bagenal**, *J. Geophys. Res., 109,* A10216, 2004

Radial variations in the Io plasma torus during the Cassini era, Delamere, P. A.; **Bagenal**, F.; Steffl, A., *J. Geophys. Res., 110,* A12223, 2005

Cassini UVIS observations of the Io plasma torus III: Temporal and Azimuthal Variability, Steffl, A., Delamere, P., **Bagenal**, F., *Icarus, 180,* p124-140, 2006

Cassini UVIS Observations of the Io Plasma Torus. IV. Modeling Temporal and Azimuthal Variability, A. J. Steffl, P. A. Delamere, F. **Bagenal**, *Icarus, 194*, 153-165, *2008*

Solar wind interaction with Jupiter's magnetosphere, P.A. Delamere, F. **Bagenal**, *J. Geophys. Res., 115,* A10201, 2010

Mass and Energy Flow Through the Magnetospheres of Jupiter and Saturn, **Bagenal**, F., P.A. Delamere, *J. Geophys. Res.*, 116, A05209, 2011

Magnetotail structure of the giant magnetospheres: Implications of the viscous interaction with the solar wind, Delamere, P. A.; **Bagenal**, F., *J. Geophys. Res., 118,* 7045-7053, 2013

Plasma conditions at Europa's orbit, **Bagenal**, Fran; Sidrow, Evan; Wilson, Robert J.; Cassidy, Timothy A.; Dols, Vincent; Crary, Frank J.; Steffl, Andrew J.; Delamere, Peter A.; Kurth, William S.; Paterson, William R., *Icarus, 261*, 1-13, 2015

Pluto's interaction with its space environment: Solar wind, energetic particles, and dust, **Bagenal**, and 156 coauthors of New Horizons Science Team, *Science,* 351, DOI: 10.1126/science.aad9045, 2016

Survey of Voyager Plasma Science Ions at Jupiter: I Analysis Method*,* **Bagenal,** F., L. P. Dougherty, K. M. Bodisch, J. D. Richardson, and J. M. Belcher *J. Geophys. Res., 122,* doi:10.1002/2016JA023797, 2017

Magnetospheric Science Objectives of the Juno Mission, F. **Bagenal**, A. Adriani, F. Allegrini, S. J. Bolton,B. Bonfond, E. J. Bunce, J.E.P. Connerney, S. W. H. Cowley, R. W. Ebert, G. R. Gladstone, C. J. Hansen, W. S. Kurth, S. M. Levin, B. H. Mauk, D. J. McComas, C. P. Paranicas, D. Santos-Costa, R. M. Thorne, P. Valek, J. H. Waite, P. Zarka, *Space Sci. Rev., 213,* 219-287, 2017