

## Curriculum Vitae

### JOHN DAVID MATHEWS

**Current Address:** 323A Electrical Engineering East  
The Pennsylvania State University  
University Park, PA 16802  
Phone: (814) 865-2354 Mobil: (814) 777-5875  
Email: JDMathews@psu.edu

**Education:** Ph.D., Department of Electrical Engineering and Applied Physics  
Case Western Reserve University (August, 1972)

M.S., Department of Electrical Engineering and Applied Physics  
Case Western Reserve University (May, 1972)

B.S. with honors, in Physics  
Case Institute of Technology (May, 1969)

**Current Research Interests:** Ionospheric electrodynamics, instabilities, and layering processes—  
radar meteor studies including radio science, aeronomy of the meteoroid  
mass flux, orbital determination and evolution, origins of interplanetary and  
interstellar particles. System-of-Systems autonomous sensor systems, radar  
signal processing, novel signal processing systems, radar holography.

**Current Events:** Publication H-index: 24  
Fellow of the Royal Astronomical Society (elected 12/10)  
Fellow of the Institute of Electrical and Electronic Engineers (elected 11/11)

**Professional Experience: (academic)** Director, Communications and Space Sciences Laboratory (CSSL)  
College of Engineering, The Pennsylvania State University (7/88 – 12/07)

Principal Investigator, NSF Space Science Faculty Development Grant  
(6/05), \$900K/5 years to add a new tenure track faculty position in the space  
sciences in CSSL

Principal Investigator - NSF Grants for Ionospheric Physics & Planetary  
Astronomy (Aug. 1975 - present; support totaling ~\$7M through 2012)  
(Current support ~\$1M thru 2012)

Full Professor (tenured): 7/87 - present  
Department of Electrical Engineering  
The Pennsylvania State University

Fulbright Scholar, Swedish Institute of Space Physics, Kiruna (8/1996-1/97)

Member, Science, Technology, & Society Faculty  
The Pennsylvania State University (5/88 – 6/95)

Full Professor: 4/85 - 6/87  
Associate Professor: 3/79 - 3/85 (tenured 1981)  
Assistant Professor: 8/75 - 2/79  
Department of Electrical Engineering & Applied Physics  
Case Western Reserve University (CWRU)

Adjunct Professor (1978 - 1986)  
The Pennsylvania State University  
Department of Electrical Engineering

Visiting Scientist (9/72 - 7/75)  
National Astronomy and Ionosphere Center  
Arecibo, Puerto Rico (employed by Case Western Reserve University)

Full Time Lecturer (9/69 - 8/72)  
Department of Electrical Engineering & Applied Physics, CWRU

**Professional  
Experience:  
(other)**

Chair, International Commission G of URSI (International Union of  
Radio Science), URSI Secretariat, Ghent, Belgium. (Vice-Chair: 08/08-  
08/11; Chair: 08/11 - ).

Member 2010, Chair 2012; MIT Haystack Observatory Visiting Committee.

Ex-officio, voting member, US National Committee for the International  
Union of Radio Science (10/09 – 12/31/2011).

Chair, USNC URSI (International Union of Radio Science) Commission G  
(1/06- 12/08); vice-chair (1/03-12/05).

Member, NSF CEDAR (Coupling, Energetics, & Dynamics of Atmospheric  
Regions) Steering Committee (6/03-7/06)

Member, Committee of Visitors (COV), NSF Upper Atmospheric Research  
Section (UARS), Division of Atmospheric Sciences (09/7-9/05)

Member, NSF Upper Atmosphere Facilities Review Panel (8/03-3/05)

Consultant to the National Astronomy and Ionosphere Center, Arecibo Observatory (1980- present)

Member, Arecibo Advisory Board and Visiting Committee (reported to the President of Cornell University) (Nov. 1989 - 1992)  
Chairman (July 1991 - 1992)

Member, Arecibo Users & Scientific Advisory Committee of the National Astronomy and Ionosphere Center (Sept. 1977 - Sept. 1980 & 3/02 – 3/04)

Consultant for manuscript and script development of WPSX-TV's Artworks program, The Machines of Leonardo Da Vinci, as well as an on-camera interview (November 26, 1990)

Consultant to Engineering Service Group and Laser Engineering Group, Lawrence Livermore National Laboratories (1979-1987)

Consulting Engineer/Forensic Physicist in electrical failure analysis, radar, and natural plasmas (1975-1995)

**Administrative  
Experience:  
(PSU)**

Director, Communications and Space Sciences Laboratory (7/88-12/2007)  
This interdisciplinary laboratory and college Center of Excellence, which is housed in Electrical Engineering, consists of about 15 faculty and about 30 graduate students. The laboratory does \$6-10M in atmosphere, ionosphere, and electromagnetics funding annually.

Organizer and host, A. H. Waynick Memorial Lecture Series (7/88-12/07)  
Speakers in this series of distinguished visitors that give both a graduate colloquium and a public lecture in their 2-3 day visit. Speakers have included Ralph J. Cicerone, Neal Lane, Edward C. Stone, Gregory Benford, Joseph H. Taylor, Lawrence M. Krauss, Freeman Dyson, Jill Tarter, Antony Hewish, & other distinguished scientists and public intellectuals.

Chairman, Artist-in-Residence Program Steering Committee  
(August 1989 - March 1990)

Director, Artist-in-Residence Program (April 1990 - June 1991)  
Originated the College of Engineering, Artist in Residence Program. This experimental program (Mathews et al., 1990) ran from July 1988 through June 1991 and placed an internationally known computer-aided sculptor, Rob Fisher, in an engineering setting where he interacted with students and faculty on a variety of projects, including scientific visualization.

Co-organizer and Co-host of the "Today's Leonardos" Symposium (14-15 Sept. 1990) and the "Tomorrow's Leonardos" Workshop (20 Oct. 1990) Both programs were presented by the Palmer Museum of Art with assistance from the College of Engineering and the College of Arts and Architecture at Penn State and the Pennsylvania Council on the Arts. The "Today's Leonardos" program brought faculty, students and other interested participants together with very interesting artists and researchers to explore relationships between contemporary art, science, and technology. The "Tomorrow's Leonardos" program provided regional science, math, and art students and teachers with an introduction to the field of engineering.

Faculty Associate for Renaissance House (Aug. 1989 - Aug. 1996)

Chair, Promotions and Tenure Committee, Department of Electrical Engineering (8/99 – 8/02)

**Teaching  
Experience:  
(PSU)**

Introduction to Electronic Measuring Systems (sophomore level)  
Design Circuits & Systems (junior level)  
Engineering Electromagnetics (junior level/graduate level)  
Electronic Circuit Design (junior-senior level)  
Introduction of Plasmas (senior-graduate level)  
Constitution of the Ionosphere (upper graduate level)  
Radio Waves and the Ionosphere (upper graduate level)  
Interdisciplinary Projects in Art and Technology  
Plasma Waves (upper graduate level)  
Theory of Plasma Waves (upper graduate level)

**Administrative  
Experience:  
(CWRU)**

Departmental graduate program director in charge of recruiting, admissions and monitoring of student programs. (about 2000 inquiries, 500 applications, and 25 admissions per year to a 60-80 student program) (1982-1986)

Developed the Electromagnetic Waves and Wave Propagation Group (8 faculty) within Department of Electrical Engineering and Applied Physics. (1983-1986)

**Teaching  
Experience:  
(CWRU)**

Electronic Circuits I (sophomore level)  
Electronic Circuits II (sophomore level)  
Communication Electronic Circuits (junior-senior level)  
Communications and Signal Analysis (senior- graduate level)  
Antennas and Propagation (senior-graduate level)  
Electromagnetic Scattering and Diffraction Theory (upper graduate level)  
Electromagnetic Fields (graduate level)

Plasma Dynamics (graduate level)  
Physics of the Atmosphere and Ionosphere (graduate level)  
Random signals (upper graduate level)  
Stochastic Electromagnetic Phenomena (upper graduate level)  
Directed work toward 3 PhD and 9 MS theses as well as 17 senior projects.

**Professional Society Memberships:** Sigma Xi  
American Geophysical Union  
URSI (International Union of Radio Science) - Commissions G & H  
Eta Kappa Nu  
IEEE (Fellow)  
European Geosciences Union  
International Astronomical Union (IAU) Commission 22 (Meteors)  
American Astronomical Society, Division of Planetary Sciences  
Royal Astronomical Society (Fellow)

**Awards:** Sigma Xi (CWRU Chapter) Research Award (1979)  
Fulbright Scholar (8/1996-1/97; Swedish Institute for Space Physics, Kiruna, Sweden)  
Fellow of the Royal Astronomical Society (2010)  
Fellow Institute of Electrical and Electronics Engineers (IEEE, 2011)

## Publication List

### Papers Submitted and in Review

- Sarkhel, S., S. Raizada, J. D. Mathews, S. Smith, C. A. Tepley, F. J. Rivera, and S. A. Gonzalez, Identification of large scale billow-like structures in the neutral sodium layer over Arecibo, *J. Geophys. Res.*, in review (2012)
- Seker, I., S. F. Fung, and J. D. Mathews, The relation between the E-region gravity waves and the F-region plasma depletion bands observed with an all-sky imager at Arecibo, *J. Geophys. Res.*, in review (2011).

### Non-Refereed Papers and News Articles

- Mathews, J. D., J. Urbina, and A. Malhotra, Adapting the New Arecibo On-Dish High Frequency (HF) Transmitter System to Radar Mode, *International Innovation* (Environment Issue April 2012), Research Media Ltd, 93-95, ISSN 2041-4552 (2012).
- Meisel, D. D., V. S. Getman, J. D. Mathews, Y. T. Morton, Q. Zhou, R. G. Roper, and B. G. Marsden, “An unusual bolide with a near-Earth orbit”, *Bul. American Astron. Soc.*, 26, 1164-1165 (1994).
- Mathews, J. D., "Catching a Meteor in the Act," (News article with two figures) *Sky and Telescope*, 30, #5, 468-469 (Nov. 1990).
- “Inbound Meteor Prompts Scientists To Urge Cataloging Space Objects”, news article by Robert C. Cowen, Christian Science Monitor, Page 11 (1 August 1995).

### Journal Articles and Reviewed Conference Proceedings (112 refereed papers):

- Mathews, J. D., “From here to ET”, *J. British Interplanetary Soc.*, 64 no 6/7, 234-241 (2011).
- Mathews, J. D., “Underdense, overdense, and Bragg scattering in radar meteors”, Proceedings of XXX URSI General Assembly and Scientific Symposium of the International Union of Radio Science, Istanbul, Turkey, 13-20 August, doi: 10.1109/URSIGASS.2011.6050923 (2011).
- Seker, I., W. E. Swartz, J. D. Mathews, and N. Aponte, “A new 3D display format relating azimuth-scanning radar data and all-sky images”, Proceedings of XXX URSI General Assembly and Scientific Symposium of the International Union of Radio Science, Istanbul, Turkey, 13-20 August, doi: 10.1109/URSIGASS.2011.6050983 (2011).
- Klenzing, J. H., I. Seker, R. F. Pfaff, D. E. Rowland, S. F. Fung, and J. D. Mathews, “Multi-Instrument Observations of an MSTID over Arecibo Observatory”, Proceedings of XXX URSI General Assembly and Scientific Symposium of the International Union of Radio Science, Istanbul, Turkey, 13-20 August, doi: 10.1109/URSIGASS.2011.6050874 (2011).
- Malhotra, A., and J. D. Mathews, “A statistical study of meteoroid fragmentation and differential ablation using the Resolute Bay incoherent scatter radar”, *J. Geophys. Res.*, 116, pp. A04316, doi:10.1029/2010JA016135 (2011).
- Seker, I., S. F. Fung, and J. D. Mathews, “The relation between magnetospheric state parameters and the occurrence of plasma depletion events in the night-time mid-latitude F-region”, *J. Geophys. Res.*, 116, A04323, doi:10.1029/2010JA015521 (2011).
- Djuth, F. T., L. D. Zhang, D. J. Livneh, I. Seker, M. P. Sulzer, J. D. Mathews, and R. L. Walterscheid, “Arecibo's thermospheric gravity waves and the case for an ocean source”, *J. Geophys. Res.*, 115, A08305, doi:10.1029/2009JA014799 (2010).

- Mathews, J. D., S. J. Briczinski, A. Malhotra, and J. Cross, "Extensive meteoroid fragmentation in V/UHF radar meteor observations at Arecibo Observatory", *Geophys. Res. Lett.*, **37**, L04103, doi:10.1029/2009GL041967 (2010).
- Malhotra, A., J. D. Mathews, and K. Ray, "Aspect sensitivity considerations in determining day-to-night variations in meteor trail durations", *Geophys. Res. Lett.*, **36**, L22105, doi:10.1029/2009GL040815 (2009).
- Malhotra, A., and J. D. Mathews, "Low-altitude meteor trail echoes", *Geophys. Res. Lett.*, **36**, L21106, doi:10.1029/2009GL040558 (2009).
- Livneh, D. J., I. Seker, F. T. Djuth, and J. D. Mathews, "Omnipresent vertically coherent fluctuations in the ionosphere with a possible worldwide-midlatitude extent", *J. Geophys. Res.*, **114**, A06302, doi:10.1029/2008JA013999 (2009).
- Seker, I., D. Livneh, and J. D. Mathews, "A 3D empirical model of F-region MSTID bands using incoherent scatter radar and allsky imaging at Arecibo", *J. Geophys. Res.*, **114**, A06302, doi:10.1029/2008JA014019 (2009).
- Briczinski, S. J., J. D. Mathews, and D. D. Meisel, "Statistical and fragmentation properties of the micrometeoroid flux observed at Arecibo", *J. Geophys. Res.*, **114**, A04311, doi:10.1029/2009JA014054 (2009).
- Roy, A., S. J. Briczinski, J. F. Doherty, and J. D. Mathews, "Genetic algorithm based parameter estimation technique for fragmenting radar meteor head-echoes", *IEEE Geosci. Remote Sens. Lett.*, **6**, 363-367, doi:10.1109/LGRS.2009.2013878 (2009).
- Malhotra, A., J. D. Mathews, and J. Urbina, "Effect of Meteor Ionization on Sporadic-E observed at Jicamarca", *Geophys. Res. Lett.*, **35**, L15106, doi:10.1029/2008GL034661 (2008) [GRL Editor's Highlight article 9 August 2008].
- Roy, A., C.-H. Wen, J. F. Doherty, and J. D. Mathews, "Signal feature extraction from microbarograph observations using the Hilbert-Huang Transform," *IEEE Trans. Geos. Remote Sens.*, **46**, 1442-1447, doi: 10.1109/TGRS.2007.909916 (2008).
- Seker, I., J. D. Mathews, D. Livneh, and J. J. Makela, "Tracking F-region plasma depletion bands using GPS-TEC, incoherent scatter radar, and all-sky imaging at Arecibo," *Earth Planets Space*, **60**, 1-13 (2008).
- Malhotra, A., J. D. Mathews, and J. Urbina, "Aspect sensitivity considerations in interpreting radar meteor range-spread trail echo durations," *Earth, Moon, Planets.*, web published, doi: 10.1007/s11038-007-9211-1 (2008).
- Malhotra, A., J. D. Mathews, and J. Urbina, "Multi-static, common volume radar observations of meteors at Jicamarca," *Geophys. Res. Lett.*, **34**, L24103, doi:10.1029/2007GL032104 (2007).
- Mathews, J. D., S. J. Briczinski, D. D. Meisel, and C. J. Heinselman, "Radio and meteor science outcomes from comparisons of meteor radar observations at AMISR Poker Flat, Sondrestrom, and Arecibo," *Earth, Moon, Planets.*, **102**, 365-372, doi:10.1007/s11038-007-9168-0 (2008).
- Malhotra, A., J.D. Mathews, and J. V. Urbina, "A Radio Science Perspective on Long Duration Meteor Trails," *J. Geophys. Res.*, **112s**, A12303, doi:10.1029/2007JA012576 (2007).
- Roy, A., J.F. Doherty, and J.D. Mathews, "Analyzing radar meteor trails echoes using the Fresnel transform technique: A signal processing viewpoint," *Earth, Moon, Planets*, **101**, 27-39, doi: 10.1007/s11038-007-9147-5 (2007).

- Livneh, D., I. Seker, F. T. Djuth, and J. D. Mathews, "Continuous quasi-periodic thermospheric waves over Arecibo," *J. Geophys. Res.*, *112*, doi:10.1029/2006JA012225 (2007).
- Wen, C.-H., D.J. Livneh, J.F. Doherty, and J.D. Mathews, "Pulse-level interference and meteor processing of Arecibo ISR data," *J. Atmos. Solar-Terr. Phys.*, *69*, 973-980, DOI:10.1016/j.jastp.2007.03.004 (2007).
- Seker, I., J.D. Mathews, J. Wiig, P. Farias-Gutierrez, J.S. Friedman, and C.A. Tepley, "First results from the Penn State Allsky Imager at Arecibo Observatory," *Earth Planets Space*, *59*, 165-176 (2007).
- Malhotra, A., J. D. Mathews, and J. Urbina, "Solving the mystery of long duration non-specular meteor echoes," Proceedings of the Eleventh International Workshop on Technical & Scientific Aspects of MST Radar, Macmillan India Ltd., Gadanki, India, 183-186, 11-15 December (2006).
- Zhou, Q.-N., and J.D. Mathews, "On the physical explanation of the Perkins instability," *J. Geophys. Res.*, *111*, A12309, doi:10.1029/2006JA011696 (2006).
- Bilen, S.G., C.R. Philbrick, T.F. Wheeler, J.D. Mathews, R.G. Melton, and D.B. Spencer, "An overview of space science and engineering education at Penn State," *IEEE Aerospace and Electronic Systems Magazine*, *21*(7), S\_23-S\_27 (2006).
- Briczinski, S.J., C.-H. Wen, J.D. Mathews, J.F. Doherty, and Q.-N. Zhou, "Robust voltage fitting techniques for meteor Doppler speed determination," *IEEE Trans. Geos. Remote Sens.*, *44*, 3490-3496 (2006).
- Zhou, Q.-N., J.D. Mathews, and C.A. Miller, "The evolution of nighttime mid-latitude mesoscale F-region structures: A case study utilizing numerical solution of the Perkins instability equations," *Planet. Space Sci.*, *54*, 710-718 (2006).
- Szasz, C., A. Pellinen-Wannberg, J. D. Mathews, N. J. Mitchell, and W. Singer, "Latitudinal Variations of Diurnal Meteor Rates," chapter in *Modern Meteor Science An Interdisciplinary View*, edited by R. Hawkes, et al., Springer Netherlands, ISBN 978-1-4020-4374-1 (2005).
- Wen, C.-H., J.F. Doherty, and J.D. Mathews, "Adaptive filtering for the separation of incoherent scatter and meteor signals for Arecibo observational data," *J. Atmos. Solar-Terr. Phys.*, *67*, 1190-1195 (2005).
- Zhou, Q.-N., J.D. Mathews, Q. Du, and C.A. Miller, "A preliminary investigation of the pseudo-spectral method numerical solution of the Perkins instability equations in the homogeneous case," *J. Atmos. Solar-Terr. Phys.*, *67*, 325-335 (2005).
- Szasz, C., A. Pellinen-Wannberg, J.D. Mathews, N.J. Mitchell, and W. Singer, "Latitudinal variations of diurnal meteor rates," *Earth, Moon, Planets.*, *95*, 101-107 (2005).
- Wen, C.-H., J.F. Doherty, J.D. Mathews, and D. Janches, "Meteor detection and non-periodic bursty interference removal for Arecibo data," *J. Atmos. Solar-Terr. Phys.*, *67*, 275-281 (2005).
- Djuth, F.T., M.P. Sulzer, S.A. Gonzales, J.D. Mathews, J.H. Elder, and R.L. Walterscheid, "A continuum of gravity waves in the Arecibo thermosphere?," *Geophys. Res. Lett.*, *31*, L16801 (2004).
- Zhou, Q.-H., Y.T. Morton, J.D. Mathews, and D. Janches, "Aspect sensitivity of VHF echoes from field aligned irregularities in meteor trails and thin ionization layers," *Atmos. Chem. Physics*, *4*, 685-692 (2004).



- Raizada, S., C.A. Tepley, D. Janches, J.S. Friedman, Q. Zhou, and J.D. Mathews, "Lidar observations of Ca and K metallic layers from Arecibo and comparison with micrometeor sporadic activity," *J. Atmos. Solar-Terr. Phys.*, **66**, 595-606 (2004).
- Wen, C.-H., J.F. Doherty, J.D. Mathews, and D. Janches, "Time-frequency radar processing for meteor detection," *IEEE Trans. Geos. Remote Sens.*, **42** (3), 501-510 (2004).
- Mathews, J.D., "Radio science issues surrounding HF/VHF/UHF radar meteor studies," *J. Atmos. Solar-Terr. Phys.*, **66**#3, 285-299 (2004).
- Mathews, J.D., J.F. Doherty, C.-H. Wen, D. Janches, and D.D. Meisel, "An update on UHF radar meteor observations and associated signal processing techniques at Arecibo Observatory," *J. Atmos. Solar-Terr. Phys.*, **65**, 1139-1149 (2003).
- Janches, D., M.C. Nolan, D.D. Meisel, J.D. Mathews, Q.-H. Zhou, and D.E. Moser, "On the geocentric micrometeor velocity distribution," *J. Geophys. Res.*, **108**, SIA 1-1 - 1-14, (2003).
- Pellinen-Wannberg, A., G. Wannberg, A. Westman, I. Häggström, J. D. Mathews, D. Janches, and D. D. Meisel, "Global interplanetary dust distribution measurements with the EISCAT and Arecibo HPLA Radars," *Proceedings RadioVetenskap och Kommunikation 02, RVK02*, 97-100 (2002).
- Meisel, D. D., D. Janches, and J. D. Mathews, "The size distribution of Arecibo interstellar particles and its implications," *Astrophys. J.*, **579**, 895-904 (2002).
- Pasko, V.P., M.A. Stanley, J.D. Mathews, U.S. Inan, and T.G. Wood, Electrical discharge from a thundercloud top to the lower ionosphere, *Nature*, **416**, 152-154 (2002).
- Janches, D., D. D. Meisel, and J. D. Mathews, "Dynamical and orbital properties of the Arecibo micrometeors," *Proceedings of IAU Colloquium181/COSPAR Colloquium 11—Dust in the solar system and other planetary systems*, Canterbury UK, 10-14 April 2000 (2002).
- Mathews, J. D., D. Janches, and D. D. Meisel, "Direct determination of the micrometeoritic mass flux into the upper atmosphere," *Proceedings of IAU Colloquium181/COSPAR Colloquium 11—Dust in the solar system and other planetary systems*, Canterbury UK, 10-14 April 2000 (2002).
- Meisel, D. D., D. Janches, and J. D. Mathews, "Extrasolar micrometeors radiating from the vicinity of the local interstellar bubble," *Astrophys. J.*, **567**, 323-341 (2002).
- Mathews, J.D., S. Gonzalez, M.P. Sulzer, Q.-H. Zhou, J. Urbina, E. Kudeki, and S. Franke, "Kilometer-scale layered structures inside spread-F," *Geophys. Res. Lett.*, **28**, 4167-4170 (2001).
- Mathews, J. D., D. Janches, Meisel, D. D., Q.-H. Zhou, "The micrometeoroid mass flux into the upper atmosphere: Arecibo results and a comparison with prior estimates," *Geophys. Res. Lett.*, **28**, 1929-1932 (2001).
- Machuga, D. W., and J. D. Mathews, "Numerical simulations of three-dimensional E-region ion trajectories in realistic tidal wind and E-field structures: Layer formation and transport," *J. Atmos. Solar-Terr. Phys.*, **63**, 1519-1528 (2001).
- Mathews, J. D., D. W. Machuga, and Q.-H. Zhou, "Observational evidence for electrodynamic linkages between spread-F, ion rain, the intermediate layer, and sporadic-E: Results from observations and simulations," *J. Atmos. Solar-Terr. Phys.*, **63**, 1529-1543 (2001).
- Zhou, Q.-H., J. D. Mathews, T. Nakamura, "Implications of meteor observations by the MU radar," *Geophys. Res. Lett.*, **28**, 1399-1402 (2001).

- Zhou, Q.-H., and J.D. Mathews, Comments on "Modelling the peak of the ionospheric E-layer" by J. E. Titheridge, *J. Atmos. Solar-Terr. Phys.*, **63**, 627-629 (2001).
- Janches, D., D. D. Meisel, and J. D. Mathews, "Orbital properties of the Arecibo micrometeoroids at Earth intersection," *Icarus*, **150**, 206-218 (2001).
- Janches, D., J. D. Mathews, D. D. Meisel, and Q.-H. Zhou, "Micrometeor observations using the Arecibo 430 MHz radar: I. Determination of the ballistic parameter from observed Doppler velocity and deceleration results," *Icarus*, **145**, 53-63 (2000).
- Janches, D., J. D. Mathews, D. D. Meisel, V. S. Getman, and Q.-H. Zhou, "Doppler studies of near-antapex UHF radar meteors," *Icarus*, **143**, 347-353 (2000).
- Mathews, J. D., D. D. Meisel, D. Janches, V. S. Getman, and Q.-H. Zhou, "Direct Doppler and scattering mechanism studies of meteor head-echoes using the Arecibo 50/430 MHz radars," Proceedings of METEOROIDS 1998, Tatranska Lomnica, Slovakia, 17-21 August, 1998, published by Astronomical Institute, Slovak Academy of Sciences, edited by W. J. Baggaley and V. Porubcan, 79-82 (1999).
- Mathews, J. D., D. D. Meisel, D. Janches, V. S. Getman, and Q.-H. Zhou, "Possible origins of low inclination antapex micrometeors observed using the Arecibo UHF radar," Proceedings of METEOROIDS 1998, Tatranska Lomnica, Slovakia, 17-21 August, 1998, published by Astronomical Institute, Slovak Academy of Sciences, edited by W. J. Baggaley and V. Porubcan, 79-82 (1999).
- Zhou, Q.-H., Q.-N. Zhou, J. D. Mathews, "Arithmetic average, geometric average, and ranking: Application to incoherent scatter radar data processing," *Radio Science*, **34**, 1227-1237 (1999).
- Zhou, Q.-H., J. D. Mathews, and Q.-N. Zhou, Incoherent scatter radar study of the impact of the meteoric influx on nocturnal E-region ionization, *Geophys. Res. Lett.*, **26**, 1833-1836 (1999).
- Zhou, Q.-H., P. Perillat, J. Y. N. Cho, and J. D. Mathews, "Simultaneous meteor echo observations by large aperture VHF and UHF radars," *Radio Sci.*, **33**, 1641-1654 (1998).
- Mathews, J. D., "Sporadic E: Current views and recent progress," *J. Atmos. Solar-Terr. Phys.*, **60#4**, 413-435 (1998).
- Mathews, J. D., M. P. Sulzer, and P. Perillat, "Aspects of layer electrodynamics inferred from high-resolution ISR observations of the 80-270 km ionosphere," *Geophys. Res. Lett.*, **24**, 1411-1414 (1997).
- Mathews, J. D., D. D. Meisel, K. P. Hunter, V. S. Getman, and Q. Zhou, "Very high resolution studies of micrometeors using the Arecibo 430 MHz radar," *Icarus*, **126**, 157-169 (1997).
- Mathews, J. D., "The dynamics of ion layer generation in the 80-150 km altitude region," *J. Atmos. Terr. Phys.*, **58**, 673-682 (1996) (invited).
- Garioian, C., and J. D. Mathews, "A common impulse in art and science," *Leonardo*, **29**, 193-196 (1996).
- Meisel, C. D., V. S. Getman, J. D. Mathews, S. C. Jacobs and R. G. Roper, "Bolide AIDA: Death of an aubrite meteoroid," *Icarus*, **116**, 227-254, (1995).
- Zhou, Q. and J. D. Mathews, "Generation of Sporadic Sodium Layers via Turbulent Heating of the Atmosphere?" *J. Atmos. Terr. Phys.*, **57**, 1309-1319 (1995).
- Zhou, Q. and J. D. Mathews, "A Spectral Technique for the Detection and Correction of Coherent Interference Effects on Radar Power Profiles," *Radio Sci.*, **29**, 5, 1173-1177 (1994).

- Mathews, J. D., T. J. Kane, C. S. Gardner, and Q. Zhou, "Ion and sodium sporadic layer results from the 1989 AIDA campaign", *COSPAR Colloquia Series*, 5, 363-368 (1994).
- Mathews, J. D. and Y. T. Morton, "Radar measurements of dynamics and layering processes in the 80-150 km region at Arecibo," *Adv.Space Res.*, 14, No. 9, 153-169 (1994) (invited).
- Mathews, John D. and C. Garoian, "Earthview: Looking Down at Ourselves," *Leonardo Electronic News*, 3, No. 7, (1993) also *Leonardo* 27, No. 3 (1994).
- Zhou, Q., J. D. Mathews, C. S. Gardner and C. A. Tepley, "A Proposed Temperature Dependent Mechanism for the Formation of Sporadic Sodium Layers," special AIDA issue of the *J. Atmosph. & Terr. Physics*, 55, No. 3, 513-521 (1993).
- Morton, Y. T., J. D. Mathews and Q. Zhou, "Further Evidence for a 6-hour Tide above Arecibo," special AIDA issue of the *J. Atmosph. Terr. Physics*, 55, No. 3, 459-465 (1993).
- Morton, Y. T. and J. D. Mathews, "Effects of the 13-14 March 1989 Geomagnetic Storm on the E-Region Tidal Ion Layer Structure at Arecibo during AIDA," special AIDA issue of the *J. Atmosph. Terr. Physics*, 55, No. 3, 467-485 (1993).
- Mathews, J. D., Q. Zhou, C. R. Philbrick, Y. T. Morton and C. S. Gardner, "Observations of Ion and Sodium Layer Coupled Processed During AIDA," special AIDA issue of the *J. Atmosph. Terr. Physics*, 55, No. 3, 487-498 (1993).
- Mathews, J. D., Y. T. Morton and Q. Zhou, "Observations of Ion Layer Motions During the AIDA Campaign," special AIDA issue of the *J. Atmosph. Terr. Physics*, 55, No. 3, 447-457 (1993).
- Kane, T. J., C. S. Gardner, Q. Zhou, J. D. Mathews and C. A. Tepley, "Lidar, Radar and Airglow Observations of a Large Sporadic Na/Sporadic E Layer Event at Arecibo during AIDA-1989," special AIDA issue of the *J. Atmosph. Terr. Physics*, 55, No. 3, 499-511 (1993).
- Mathews, J.D., C.L. McCart, E.H. Klevans, R.A. Walker, R. Fisher, K.S. Kunz, and J.A. Brighton, "An Artist-in-Residence Program in the Pennsylvania State University College of Engineering," *Leonardo*, 23, No. 2/3, 227-230 (1990).
- Tong, Yu, J.D. Mathews and W.-P. Ying, "An Upper E Region Quarterdiurnal Tide at Arecibo?" *J. Geophys. Res.*, 93, 10047-51 (1988).
- Rastogi, P.K., J.D. Mathews, W.-P. Ying and J. Rüttger, "Simultaneous VHF and UHF Radar Observations of the Mesosphere at Arecibo During a Solar Flare: A Check on the Gradient-Mixing Hypothesis," *Radio Science*, 23, 97-105 (1988).
- Mathews, J.D., J.K. Breakall, and M.P. Sulzer, "The Moon as a Calibration Target of Convenience for VHF-UHF Radar Systems," *Radio Science*, 23, 1-12 (1988).
- Ying, W.-P., J.D. Mathews and P.K. Rastogi, "Interference Detection and Correction Applied to D Region Incoherent Scatter Radar Power Spectral Measurements," *Radio Science*, 22, 307-312 (1987).
- Mathews, J.D., "Some Aspects of Metallic Ion Chemistry and Dynamics in the Mesosphere and Thermosphere," *First GLOBMET Symposium issue, MAP Handbook*, 25, 228-254 (1987).
- Mathews, J.D., "Incoherent Scatter Radar Probing of the 60-100 km Atmosphere and Ionosphere," *IEEE Trans. Geosci. Remote Sensing*, GE-24, 765-776 (1986).
- German, M.J. and J.D. Mathews, "Interference Detection and Correction Applied to Incoherent Scatter Radar Power Profile Measurements," *Radio Science*, 21, 745-751 (1986).

- Tepley, C.A. and J.D. Mathews, "Incoherent Scatter Radar Determination of the Temperature and Composition of a Nighttime 92 km Sporadic Layer at Arecibo," *J. Geophys. Res.*, *90*, 3517-3519 (1985).
- Mathews, J.D., J.K. Breakall, G.K. Karawas, "The Discrete Prolate Spheroidal Filter as a Digital Signal Processing Tool," *IEEE Trans. on Acoustics, Speech and Signal Processing*, ASSP-33, 1471-1478 (1985).
- Mathews, J.D., "The Incoherent Scatter Radar as a Tool for Studying the Ionosphere D-Region," *J. Atmos. Terr. Phys.*, *46*, 975-986 (1984).
- Mathews, J.D., "Incoherent Scatter Radar Studies of the Mesosphere," Chapt. 11 (invited), *Middle Atmosphere Program (MAP) Handbook*, *13*, R.A. Vincent, ed. (1984).
- Min, Wang, B.S. Tanenbaum and J.D. Mathews, "Diffusion of a Multi-component Plasma," *Planet. Space Sci.*, *31*, 591-596 (1983).
- Sulzer, M.P., J.D. Mathews and A.A. Tomko, "A UHF Cross-Modulation D-Region Heating Experiment with Aeronomic Implications," *Radio Science*, *17*, 435-443 (1982).
- Mathews, J.D., J.K. Breakall and S. Ganguly, "The Measurement of Diurnal Variations of Electron Concentration in the 60 km - 100 km Ionosphere at Arecibo," *J. Atmos. Terr. Phys.*, *44*, 441-448 (1982).
- Breakall, J.K. and J.D. Mathews, "A Theoretical and Experimental Investigation of Antenna Near-Field Effects as Applied to Incoherent Backscatter Measurements Arecibo," *J. Atmos. Terr. Phys.*, *44*, 449-454 (1982).
- Tepley, C.A., J.W. Meriwether, Jr., J.C.G. Walker and J.D. Mathews, "Observations of Neutral Iron Emission in Twilight Spectra," *J. Geophys. Res.*, *86*, 4831-4835 (1981).
- Tepley, C.A., J.D. Mathews, J.W. Meriwether, Jr. and J.C.G. Walker, "Observations of the  $\text{Ca}^+$  Twilight Airglow from the Intermediate E-Layer Over Arecibo," *J. Geophys. Res.*, *86*, 7781-86 (1981).
- Tepley, C.A., J.D. Mathews and S. Ganguly, "Incoherent Scatter Radar Studies of Mesospheric Temperatures and Collision Frequencies at Arecibo," *J. Geophys. Res.*, *86*, 11330-34 (1981).
- Mathews, J.D. and B.S. Tanenbaum, "A Plasma Wave and Electron-Plasma Diffusion Interpretation of Thomson Scattering from a Plasma Containing Negative Ions," *Planet. Space Sci.*, *29*, 335-340 (1981).
- Mathews, J.D., M.P. Sulzer, C.A. Tepley, R. Bernard, J.L. Fellous, M. Glass, M. Massebeauf, S. Ganguly, R.M. Harper, R.A. Behnke and J.C.G. Walker, "A Comparison Between Thomson Scatter and Meteor Radar Wind Measurements in the 65-105 km Altitude Region at Arecibo," *Planet. Space Sci.*, *29*, 341-348 (1981).
- Mathews, J.D., "D-Region Research at Arecibo," *J. Atmos. Terr. Phys.*, *43*, 549-556 (1981).
- Mathews, J.D., and F.S. Bekeny, "Upper Atmospheric Tides and the Vertical Motion of Ionospheric Sporadic Layers at Arecibo," *J. Geophys. Res.*, *84*, 2743-50 (1979).
- Ganguly, S., J.D. Mathews and C.A. Tepley, "Thomson Scatter Radar Detection of D-Region Negative Ions at Arecibo," *Geophys. Res. Lett.*, *6*, 89-92 (1979).
- Tepley, C.A. and J.D. Mathews, "Preliminary Measurements of Ion-Neutral Collision Frequencies and Mean Temperatures in the Arecibo 80-100 km Altitude Region," *J. Geophys. Res.*, *81*, 3299-3302 (1978).

- Mathews, J.D. and F.S. Bekeny, "The Effect of Negative Ions on Thomson Scattering in the Presence of Electron Heating," *Geophys. Res. Lett.*, 5, 925-927 (1978).
- Mathews, J.D. , "The Effect of Negative Ions on Collision Dominated Thomson Scattering," *J. Geophys. Res.*, 81, 505-512 (1978).
- Mathews, J.D., "Measurements of the Diurnal Tides in the 80-100 km Altitude Range at Arecibo," *J. Geophys. Res.*, 81, 4671-77 (1976).
- Rowe, J.F., Jr. and J.D. Mathews, "Low-Latitude Nighttime E-Region Conductivities," *J. Geophys. Res.*, 78, 7461-70 (1973).
- Mathews, J.D. and B.S. Tanenbaum, "Loop Structuring of Ionogram Traces," *J. Atmos. Terr. Phys.*, 35, 775-783 (1973).
- Mathews, J.D., J.H. Shapiro and B.S. Tanenbaum, "Evidence for Distributed Scattering in D-Region Partial-Reflection Processes," *J. Geophys. Res.*, 78, 8266-75 (1973).
- Mathews, J.D. and R.M. Harper, "Incoherent Scatter Radar Observations of Spread-F Producing Ionospheric Structures at Arecibo," *J. Atmos. Terr. Phys.*, 34, 1119-27 (1972).
- Mathews, J.D. and D.J. Connolly, "A High Frequency Dynamic Phase Metering Instrument for Ionospheric Research," *J. of Physics E: Scientific Instruments*, 5, 782-84 (1972).

### **Special Reports**

- NSF AMISR Site Visit Panel Report on the Poker Flat Incoherent Scatter Radar (PFISR) Management and Operations Plan, C. R. Clauer, M. Hagan (chair), D. Hysell, J. D. Mathews, J. Semeter, J. Sojka, C. Valladares, 8 pages, March 2007.
- NSF Upper Atmosphere Facilities Review Report, S. K. Avery (chair), C. R. Clauer, M. E. Hagan, J. D. Mathews, J. D. Sahr, M. J. Taylor, 88 pages, June 2004.

### **Invited Conference, Summer School or Workshop Papers:**

- Mathews, J. D., A. Malhotra, and S. J. Briczinski, "Meteoroid Fragmentation Observations at Arecibo and Jicamarca: Aeronomic Implications", paper C11-0046-0041, presented at 38th COSPAR Scientific Assembly, Bremen, Germany, 18-25 July 2010.
- Mathews, J. D., "Metal ions in sporadic-E layers along with some speculation about analogous phenomena on other planets", invited paper, presented at 2009 CEDAR Workshop, Santa Fe (28 June - 2 July 2009).
- Mathews, J. D., "Meteor science (including chemistry) and layering phenomena in the lower thermosphere. Is there anything that we lack basic knowledge of and how should we go about it?", *12th International Symposium on Equatorial Aeronomy*, Heraklion, Crete, Greece (18-24 May, 2008).
- Mathews, J.D., A. Malhotra, and Q.-H. Zhou, "Apparent effect of meteor trails on the formation and evolution of E-region field-aligned irregularities", *URSI National Radio Science Meeting*, Boulder CO (4-7 January, 2006).
- Mathews, J.D., S.J. Briczinski, D.D. Meisel, and E.E. Bauer, GHJ.6(0342) "Arecibo radar meteor studies: Radio science, aeronomic, and interplanetary environment implications and results", *XXVIIIth General Assembly of the International Union of Radio Science (URSI)*, New Delhi, India (22-29 October, 2005).
- Makela, J.J., M.C. Kelley, J.D. Mathews, P.M. Kintner, N. Aponte, B.M. Ledvina, M.J. Nicolls, and I. Seker, "Steep electron density gradients in the midlatitude nighttime ionosphere: Current understanding and future directions", *American Geophysical Union, Fall Meeting*, San Fansisco (5-9 December, 2004).
- Mathews, J.D., "The application of plasma concepts to radar meteor issues", *URSI National Radio Science Meeting*, Boulder CO, G/H2-1 (5-8 January, 2004).
- Mathews, J.D., "Radio science issues surrounding HF/VHF/UHF radar meteor studies," *IEEE/APS/URSI North American Radio Science Meeting*, Columbus, OH, 20.1 (22-27 June, 2003).
- Zhou, Q.-H., D. Janches, T. Nakamura, J.D. Mathews, Y.T. Morton, and T. Stover, "UHF and VHF meteor observations using the Arecibo and MU radars", *IEEE/APS/URSI North American Radio Science Meeting*, Columbus OH, Invited, 20.2 (22-27 June, 2003).
- Mathews, J.D., "Radio science issues surrounding HF/VHF/UHF radar meteor studies," *Arecibo Radar Meteor Workshop*, Arecibo Observatory (10-12 March, 2003).
- Pasko, V., M. Stanley, J. Mathews, U. Inan, and T. Wood, "Electrical discharge from a thundercloud top to the lower ionosphere," *27th General Assembly of the International Union of Radio Science, Proceedings CD*, HGE1-0857, Maastricht, The Netherlands (17-24 August 2002).
- Pasko, V., M. Stanley, J. Mathews, U. Inan, and T. Wood, "Electrical discharge from a thundercloud top to the lower ionosphere," *2002 CEDAR Workshop*, Longmont, Colorado (16-21 June 2002).
- Mathews, J. D., "Some thoughts on micrometeoroids and dusty plasmas," *URSI National Meeting*, Boulder CO (9-12 Jan, 2002).

- Pasko, V. P. U. S. Inan, T. G. Wood, M. A. Stanley, J. D. Mathews, J. J. George, N. T. Fong, "Observations of Early/Fast VLF Events on Vieques Island, Puerto Rico," *American Geophysical Union 2002 Fall Meeting*, San Francisco, California, *EOS*, 83, N 47, p. F138 (6-10 December 2002).
- Mathews, J. D., D. Janches, D. D. Meisel, Q.-H. Zhou, S. Close, and A. Pellinen-Wannberg, "The role of large-aperture V/UHF radar meteor observations in meteor science," *Meteoroids 2001*, Kiruna, Sweden (6-10 August 2001).
- Mathews, J. D., Q.-H. Zhou, and D. Janches, "New aeronomic and radio science results from meteor observations made using the large-aperture V/UHF radars," paper 37.1, *CEDAR 2001*, Longmont, CO (17-22 June 2001).
- Pellinen-Wannberg, A., D. Janches, A. Westman, J. D. Mathews, and D. D. Meisel, "Interplanetary dust particle distribution in the Earth's vicinity studies with the EISCAT and Arecibo IS radar systems," 10th EISCAT Workshop, Tokyo, Japan (23-27 July 2001).
- Mathews, J. D., D. Janches, and D. D. Meisel, "The micrometeoroid mass flux into the upper atmosphere: An update on Arecibo results and a comparison with past estimates," *URSI US National Meeting*, Boulder CO (8-11 January 2001).
- Mathews, J. D., "A review of meteor physics and radar scattering mechanisms," *CEDAR 2000*, Boulder, CO (25-30 June 2000).
- Kane, T.J., J.D. Mathews, S. Collins, and G. Earle, "Recent multi-instrument observations of layering in the MLT region above Arecibo", *International Union of Geodesy and Geophysics (IUGG) General Assembly XXII*, Birmingham, UK, 1999.
- Zhou, Q.-H., J. D. Mathews, and Q.-N. Zhou, "Incoherent scatter radar study of the impact of meteoric flux on E-region ionization", *URSI National Radio Science Meeting*, Boulder, CO (4-8 January 1999).
- Zhou, Q.-H., J. D. Mathews, and D. D. Meisel, "Meteor studies at Arecibo Observatory," *URSI National Radio Science Meeting*, Boulder, CO (5-9 January 1998).
- Mathews, J. D., D. D. Meisel, and Q. Zhou, "The radar scattering properties of meteors: A brief review and a few thoughts," *URSI National Radio Science Meeting*, Boulder, CO (5-9 January 1998).
- Janches, D., J. D. Mathews, D. D. Meisel, and Q. Zhou, "UHF observations of meteors during the November 1995 Leonids period," *URSI National Radio Science Meeting*, Boulder, CO (5-9 January 1998).
- Mathews, J. D., D. W. Machuga and M. P. Sulzer, "The Intermediate Tidal Ion Layer, Ion Rain, and F-Region Instabilities," 1997 IEEE AP-S International Symposium and URSI Radio Science Meeting, Montreal, Canada (July, 1997).
- Mathews, J. D., D. D. Meisel and Q. Zhou, "Very High Resolution Radar Studies of Micrometeors at Arecibo Observatory," *American Geophysical Union Spring 1997 Meeting*, Baltimore, Md. (May 27-30, 1997).
- Mathews, J. D., "Apparent electrodynamic coupling of ion layers in the 90-270 km altitude region above Arecibo," 1996 National Radio Science Meeting, Boulder, CO, USA (9-13 January, 1996).

- Mathews, J. D., M. P. Sulzer, and P. Perillat, "High-resolution ISR observations of layer and wave structures in the 80-200 km altitude region above Arecibo: Initial results and interpretations," URSI National Radio Science Meeting, Boulder, CO (January 3-7, 1995).
- Mathews, J. D., "Aspects of layer and wave processes revealed by high-resolution ISR observations of the 50-270 km ionosphere at Arecibo," XXI General Assembly, International Union of Geodesy and Geophysics, Boulder, CO, USA (July 2-14, 1995).
- Mathews, J. D., "Lower ionosphere dynamics and chemistry as observed using incoherent scatter radar techniques alone and in combination with other instruments. In:," 30th COSPAR Scientific Assembly, Hamburg, Germany (1994).
- Mathews, J. D., "Radar Measurements of Dynamics and Layering Processes in the 80-150 km Region at Arecibo," World Space Congress, Washington, DC (August 28-September 5, 1992).
- Mathews, J. D., Q. Zhou, T. J. Kane, and C. S. Gardner, "Ion and Sodium Sporadic Layer Results from 1989 AIDA Campaign," 1992 STEP (Solar Terrestrial Energy Program) Symposium/5th COSPAR (Committee on Space Research) Colloquium, Johns Hopkins University, Applied Physics Laboratory, Baltimore, MD (August 24-28, 1992).
- Getman, V.S., J.D. Mathews, Y.T. Morton, Q. Zhou, and R.G. Roper, "Observations of Long-Lived Meteor Trails at Arecibo Using Optical and Radar Techniques," International Symposium on Middle Atmosphere Studies, Dushanbe, Tadzhikistan, USSR (November, 1989).
- Mathews, J.D., Y.T. Morton, and Q. Zhou, "Tides and Acoustic-Gravity Waves as Observed in the Motions of Ionospheric E Region Meteoric Ion Layers," International Symposium on Middle Atmosphere Studies, Dushanbe, Tadzhikistan, USSR (November, 1989).
- Mathews, J.D., C.R. Philbrick, Q. Zhou, C.S. Gardner, and T.J. Beatty, "Simultaneous Observations of Narrow Sodium and Narrow Ionization Layers Using both Lidar and Incoherent Scatter Radar Techniques at Arecibo," International Symposium on Middle Atmosphere Studies, Dushanbe, Tadzhikistan, USSR (November, 1989).
- Mathews, J.D., C.L. McCart, E.H. Klevans, R.A. Walker, R. Fisher, K.S. Kunz, and J.A. Brighton, "An Artist-in-Residence Program in a College of Engineering," IEEE Society on Social Implications of Technology conference A Delicate Balance: Technics, Culture, and Consequences, California State University, Los Angeles (Oct. 20-21, 1989).
- Mathews, J.D., "Some Aspects of Metallic Ion Chemistry and Dynamics in the Mesosphere and Thermosphere," First GLOBMET Symposium, Dushanbe, Tadzhikistan, USSR (August 1985).
- Mathews, J.D., "The Incoherent Scatter Radar as a Tool for Studying the Ionosphere D-Region", XVIII General Assembly, International Union of Geodesy and Geophysics (IUGG), Inter-Disciplinary Symposium in Interim Results from the Middle Atmosphere Program, Hamburg, Federal Republic of Germany (August 15-27, 1983).
- Mathews, J.D., J.K. Breakall, M.P. Sulzer and J.K. Hargreaves, "Incoherent Scatter Radar Observations of the 60-100 km Ionosphere at Arecibo," spring 1983 American Geophysical Union Meeting, Baltimore, Maryland (June 1983).



- Mathews, J.D., J.K. Breakall and G.K. Karawas, "The Discrete Prolate Spheroidal Filter as a Digital Signal Processing Tool," Workshop on Technical Aspects of MST Radars, Urbana, Illinois (May 23-27, 1983).
- Mathews, J.D., "Possibilities for Multiple Incoherent Scatter Radar D-Region Studies," Second Workshop on the Incoherent Scatter Radar Database", Boulder, Colorado (Feb. 9-10, 1983).
- Mathews, J.D., "The Low Latitude D-Region Chemistry," United Kingdom 1982 ISCAT Summer School, Sheffield, England (Sept. 1982).
- Mathews, J.D., "Incoherent Scatter Theory and Practice in the D-Region," United Kingdom 1982 ISCAT Summer School, Sheffield, England (Sept. 1982).
- Mathews, J.D., "D-Region Research at Arecibo," 6th International Symposium of Equatorial Aeronomy, Aguadilla, Puerto Rico (July 1980).

### **Meeting Presentations:**

- Mathews, J. D., The Role of Optically-Thin and Bragg Scattering in Radar Meteors, paper 5 - Irregularity Physics (II), presented at 13th International Symposium on Equatorial Aeronomy (ISEA13), Paracas Peru, 12-16 March 2012.
- Mathews, J. D., B. Gao, J. Urbina, F. Galindo, and A. Malhotra, Meteoroid Fragmentation and High-Altitude Meteors Observed at Jicamarca, paper 6 - New techniques, experiments, campaigns, results (II), presented at 13th International Symposium on Equatorial Aeronomy (ISEA13), Paracas Peru, 12-16 March 2012.
- Briczinski, S. J., J. D. Mathews, and P. J. Erickson, Transmitter Power Studies on Meteor Radar Head Echo Returns, paper HG4-4, presented at USNC-URSI National Radio Science Meeting, Boulder CO USA, 4-7 January 2012.
- Sarkhel, S., S. Raizada, J. D. Mathews, C. A. Tepley, and S. A. Gonzalez, Identification of large scale billows-like structure in the neutral Na layer over Arecibo, paper SA23B-04, presented at AGU Fall Meeting, San Francisco, 5-9 December 2011.
- Mathews, J. D., Underdense, overdense, and Bragg scattering in radar meteors, Proceedings of XXX URSI General Assembly and Scientific Symposium of the International Union of Radio Science, Istanbul, Turkey, 13-20 August 2011.
- Seker, I., W. E. Swartz, J. D. Mathews, and N. Aponte, A new 3D display format relating azimuth-scanning radar data and all-sky images, Proceedings of XXX URSI General Assembly and Scientific Symposium of the International Union of Radio Science, Istanbul, Turkey, 13-20 August 2011.
- Klenzing, J. H., I. Seker, R. F. Pfaff, D. E. Rowland, S. F. Fung, and J. D. Mathews, Multi-Instrument Observations of an MSTID over Arecibo Observatory, Proceedings of XXX URSI General Assembly and Scientific Symposium of the International Union of Radio Science, Istanbul, Turkey, 13-20 August 2011.
- Mathews, J. D., How do we make sense of non-smooth radar "light curves"?, presented at CEDAR Workshop, Santa Fe NM, 26 June - 1 July 2011.
- Mathews, J. D., On the role of Bragg scattering in radar meteor head-echoes, paper G3-9, presented at USNC-URSI National Radio Science Meeting, Boulder CO, 5-8 January 2011.

- Mathews, J. D., and F. T. Djuth, Radar meteor evidence that meteoroid flares generate intense plasma waves, paper G3-10, presented at USNC-URSI National Radio Science Meeting, Boulder CO, 5-8 January 2011.
- Briczinski, S. J., and J. D. Mathews, Statistical implications of UHF diurnal meteor observations, paper G3-4, presented at USNC-URSI National Radio Science Meeting, Boulder CO, 5-8 January 2011.
- Seker, I., S. F. Fung, and J. D. Mathews, The relation between magnetospheric state parameters and the occurrence of plasma depletion events in the night-time mid-latitude F-region, paper IT-MDIT-13, presented at CEDAR 2010 Workshop, Boulder CO, 20-25 June 2010.
- Ore, J., and J. D. Mathews, V/UHF Radar Meteors at Arecibo: The Usual Suspects plus some Bolides, paper MLT-MTR-04, presented at CEDAR 2010 Workshop, Boulder CO, 20-25 June 2010.
- Mathews, J. D., A. Malhotra, and J. Ore, Meteoroid fragmentation as revealed in Arecibo V/UHF and Resolute Bay radar meteor observations, presented at CEDAR 2010 Workshop, Boulder CO, 20-25 June 2010.
- Meisel, D. D., J. Kero, C. Szasz, A. Pellinen-Wannberg, and J. D. Mathews, IBEX Observations of the Heliosphere: Implications for Interstellar Meteors, presented at Meteoroids 2010, Breckenridge CO USA, 24-28 May 2010.
- Malhotra, A., and J. D. Mathews, A study on various meteoroid disintegration mechanisms as observed from the Resolute Bay Incoherent Scatter Radar (RISR)), Proceedings of Meteoroids 2010, NASA, Breckenridge CO, 24-28 May 2010.
- Mathews, J. D., and A. Malhotra, Meteoroid fragmentation as revealed in head- and trail-echoes observed with the Arecibo UHF and VHF radars, Proceedings of Meteoroids 2010, NASA, Breckenridge CO, 24-28 May 2010.
- Malhotra, A., and J. D. Mathews, The implications of Low Altitude Trail Echoes (LATE) and aspect sensitive Range Spread Trail-Echoes (RSTE) observed using the Jicamarca VHF and the Arecibo U/VHF radars, presented at Meteoroids 2010, Breckenridge CO, 24-28 May 2010.
- Mathews, J. D., J. Urbina, and A. Malhotra, Adapating the new Arecibo on-dish HF transmitter system to radar mode, presented at HF Facility Workshop, Arecibo Observatory, 29-31 March 2010.
- Briczinski, S. J., J. D. Mathews, and C. J. Heinselman, Meteor Observations From The Resolute Bay Incoherent Scatter Radar: First Results And Comparison To Poker Flat, paper G1-1, presented at URSI National Radio Science Meeting, Boulder CO, 6-9 January 2010.
- Mathews, J. D., S. J. Briczinski, A. Malhotra, and J. Cross, The radio science implications of VHF & UHF meteor trails at Arecibo, paper G1-3, presented at URSI National Radio Science Meeting, Boulder CO, 6-9 January 2010.
- Malhotra, A., J. D. Mathews, and K. Ray, Aspect sensitivity considerations in determining meteor trail durations, paper G1-4, presented at URSI National Radio Science Meeting, Boulder CO, 6-9 January 2010.
- Mathews, J. D., J. Urbina, and A. Malhotra, Adapting the new Arecibo on-dish HF transmitter system to radar mode, paper G2-4, presented at URSI National Radio Science Meeting, Boulder CO, 6-9 January 2010.

- Seker, I., S. F. Fung, and J. D. Mathews, The relation between magnetospheric state parameters and the occurrence of night-time mid-latitude plasma depletions in the F-region, paper SA23B-1471, presented at AGU Fall Meeting, San Francisco, 14-18 December 2009.
- Mathews, J. D., S. J. Briczinski, A. Malhotra, and J. Cross, What do we know about meteoroid fragmentation?, presented at 2009 CEDAR Workshop, Santa Fe, 28 June - 2 July 2009.
- Seker, I., and J. D. Mathews, The properties and 3D structure of medium scale traveling ionospheric disturbances, paper presented at 2009 CEDAR Workshop, Santa Fe, 28 June - 2 July 2009.
- Djuth, F. T., L. D. Zhang, D. J. Livneh, I. Seker, M. P. Sulzer, J. D. Mathews, and R. L. Walterscheid, Arecibo's thermospheric gravity waves and the case for an ocean source, presented at 2009 CEDAR Workshop, Santa Fe, 28 June - 2 July 2009.
- Malhotra, A., and J. D. Mathews, Evolution of meteor trails and its dependence on altitude, paper presented at URSI National Radio Science Meeting, Boulder, CO, 6-9 January 2009.
- Mathews, J. D., Radar meteor science: Where are we and where next? Paper GP2-05.24, paper presented at XXIX General Assembly of the International Union of Radio Science, Chicago IL, 7-17 August 2008.
- Mathews, J. D., Meteor highlights, paper presented at 2008 CEDAR Workshop, Midway, Utah, 16-21 June 2008.
- Mathews, J. D., D. J. Livneh, I. Seker, and F. T. Djuth (2008), Quasi-periodic F-region MSTIDs at Arecibo: A magnetospheric link?, paper presented at 2008 CEDAR Workshop, Midway, Utah, 16-21 June 2008.
- Malhotra, A., J. D. Mathews, and J. Urbina, Effect of meteor ionization on Sporadic-E observed at Jicamarca, paper presented at 2008 CEDAR Workshop, Midway, Utah, 16-21 June 2008.
- Seker, I., and J. D. Mathews, Clues to the properties of MSTIDs using azimuth-scanning ISR and all-sky imaging, paper presented at 2008 CEDAR Workshop, Midway, Utah, 16-21 June 2008.
- Malhotra, A., J. D. Mathews, and J. Urbina, Sporadic E layers at Jicamarca??!, paper presented at 12th International Symposium on Equatorial Aeronomy, Heraklion, Crete, Greece, 18-24 May 2008.
- Mathews, J. D., D. J. Livneh, I. Seker, and F. T. Djuth, Quasi-periodic F-region MSTIDs at Arecibo: A magnetospheric link?, paper presented at 12th International Symposium on Equatorial Aeronomy, Heraklion, Crete, Greece, 18-24 May 2008.
- Mathews, J. D., S. J. Briczinski, D. D. Meisel, and C. J. Heinselman, The Three Radars: Radio and meteor science outcomes from comparisons of meteor radar observations at AMISR Poker Flat, Sondrestrom, and Arecibo, paper presented at URSI National Radio Science Meeting, Boulder, CO, 3-6 January 2008.
- Malhotra, A., J. D. Mathews, and J. Urbina, On the formation and evolution of radar meteor trails, paper presented at URSI National Radio Science Meeting, Boulder, CO, 3-6 January, 2008.
- Briczinski, S. J., J. D. Mathews, and D. D. Meisel, A statistical analysis of automated-search meteor results from radar observations at Arecibo, non-decelerating events and their implication in meteor mass flux estimates, paper presented at URSI National Radio Science Meeting, Boulder, CO, 3-6 January, 2008.

- Livneh, D. J., J. D. Mathews, and F. T. Djuth, Omnipresent waves in the thermosphere?, paper presented at URSI National Radio Science Meeting, Boulder, CO, 3-6 January 2008.
- Malhotra, A., J. D. Mathews, and J. Urbina, A radio science perspective on range-spread trail-echoes, paper presented at URSI North American Radio Science Meeting, Ottawa, Canada, 22-26 July, 2007.
- Malhotra, A., J. D. Mathews, and J. Urbina, Bi-static, common volume radar meteor observations at Jicamarca, paper presented at URSI North American Radio Science Meeting, Ottawa, Canada, 22-26 July, 2007.
- Mathews, J. D., S. J. Briczinski, D. D. Meisel, and C. J. Heinselman, A comparison of automated-search meteor results from radar observations at AMISR Poker Flat, Sondrestrom, and Arecibo, paper presented at URSI North American Radio Science Meeting, Ottawa, Canada, 22-26 July 2007.
- Livneh, D. J., I. Seker, F. T. Djuth, and J. D. Mathews, Continuous quasi-periodic thermospheric waves over Arecibo and Millstone, paper presented at URSI North American Radio Science Meeting, Ottawa, Canada, 22-26 July, 2007.
- Seker, I., and J. D. Mathews, Clues to the 3D structure of MSTID bands using azimuth-scanning ISR and allsky imaging, paper presented at CEDAR 2007 Workshop, Santa Fe, NM, 24-29 June 2007.
- Briczinski, S. J., J. D. Mathews, D. D. Meisel, and C. J. Heinselman, Size does matter - The effect of radar wavelength on meteor results from high latitude observations, paper presented at CEDAR 2007 Workshop, Santa Fe, NM, 24-29 June 2007.
- Livneh, D. J., J. D. Mathews, I. Seker, and F. T. Djuth, Continuous F-region waves over Atlantic North America, paper presented at CEDAR 2007 Workshop, Santa Fe, NM, 24-29 June 2007.
- Malhotra, A., J. D. Mathews, and J. Urbina (2007), A radio science perspective on long-duration meteor trails, paper presented at CEDAR 2007 Workshop, Santa Fe, NM, 24-29 June.
- Mathews, J. D., S. J. Briczinski, D. D. Meisel, and C. J. Heinselman, Radio and meteor science outcomes from comparisons of meteor radar observations at AMISR Poker Flat, Sondrestrom, and Arecibo, paper presented at Meteoroids 2007, Barcelona Spain, 11-15 June, 2007.
- Malhotra, A., J. D. Mathews, and J. Urbina, A radio science perspective on range-spread trail-echoes observed at Jicamarca, paper presented at Meteoroids 2007, Barcelona Spain, 11-15 June 2007.
- Malhotra, A., J. Chau, and J. D. Mathews, Solving the mystery of long duration non-specular meteor echoes, paper presented at MST11 International Workshop on Technical and Scientific Aspects of MST Radar, Gadanki, India, 11-15 Dec, 2006.
- Briczinski, S. J., J. D. Mathews, D. D. Meisel, and C. J. Heinselman, A comparison of automated-search meteor results from radar observations at two locations, paper presented at CEDAR Workshop, Santa Fe NM, 19-23 June, 2006.
- Gutierrez, P. F., A. Cerruti, J. Friedman, R. Garcia, H. Hvo, M. C. Lee, J. D. Mathews, C. R. Martinis, M. Mendillo, J. Meriweather, S. Razida, E. Robles, S. M. Smith, C. A. Tepley, and J. Wiig, AO SAS instrumentation overview, paper presented at CEDAR Workshop, Santa Fe NM, 19-23 June, 2006.

- Seker, I., J. D. Mathews, J. Wiig, P. F. Gutierrez, J. Friedman, and C. A. Tepley, Categorization of the events observed by the Penn State Allsky Imager at Arecibo Observatory, paper presented at CEDAR Workshop, Santa Fe NM, 19-23 June, 2006.
- Livneh, D. J., and J. D. Mathews, Thermospheric waves over Arecibo, paper presented at CEDAR Workshop, Santa Fe NM, 19-23 June, 2006.
- Briczinski, S.J., J.D. Mathews, D.D. Meisel, and C.J. Heinselman, A comparison of automated-search meteor results from radar observations at two locations, *URSI National Radio Science Meeting*, Boulder CO, 4-7 January, 2006.
- Wen, C.-H., D.J. Livneh, J.F. Doherty, and J.D. Mathews, Pulse-level interference and meteor processing of Arecibo ISR data, *URSI National Radio Science Meeting*, Boulder CO, 4-7 January, 2006.
- Mathews, J.D., S.J. Briczinski, D.D. Meisel, J.K. Breakall, M.P. Sulzer, P. Perillat, and E.I. Castro, GP2.6(01674) An on-dish 430 MHz interferometer for radar meteor observations at Arecibo, *XXVIIIth General Assembly of the International Union of Radio Science (URSI)*, New Delhi, India, 22-29 October, 2005.
- Livneh, D.J., and J.D. Mathews, DUMBO and the ionosphere, *Joint CEDAR/GEM Workshop*, Santa Fe NM, 26 June - 1 July, 2005.
- Briczinski, S.J., J.D. Mathews, and D.D. Meisel, Aeronomic implications of automated Arecibo UHF meteor observations, *CEDAR-GEM Joint Workshop*, Santa Fe NM, June 26 - July 1, 2005.
- Zhou, Q.-N., J.D. Mathews, I. Seker, and N. Aponte, A numerical simulation of the extended Perkins instability equations with real-time electric fields and comparison with 630.0 nm airglow images., *CEDAR-GEM Joint Workshop*, Santa Fe NM, June 26 - July 1, 2005.
- Seker, I., J.D. Mathews, and Q.-N. Zhou, Context is everything! The F-region electrodynamics using the Incoherent Scatter Radar and Allsky Imager at Arecibo, *Joint CEDAR/GEM Workshop*, Santa Fe NM, 26 June - 1 July, 2005.
- Roy, A., J.F. Doherty, and J.D. Mathews, Deconstructing classical trail meteor echoes - A post-modern view, *CEDAR-GEM Joint Workshop*, Santa Fe NM, June 26 - July 1, 2005.
- Mathews, J.D., Nighttime mid-latitude F-region structures: What are they, and should we study them? *CEDAR-GEM Joint Workshop*, Santa Fe NM, June 26 - July 1, 2005.
- Malhotra, A., J.D. Mathews, and Q.-H. Zhou, Mysteries of the MU - Initial observations and analysis of MU data, *CEDAR-GEM Joint Workshop*, Santa Fe NM, June 26 - July 1, 2005.
- Bishop, R.L., N. Aponte, D. Livneh, J.D. Mathews, M.P. Sulzer, G.D. Earle, T. Bullett, and P. Straus, An investigation of possible coupling between the passage of a tropical storm and the local ionosphere, *American Geophysical Union Meeting*, New Orleans LA, 23-27 May, 2005.
- Bishop, R.L., N. Aponte, M.P. Sulzer, D. Livneh, J.D. Mathews, G.D. Earle, T. Bullett, and P. Straus, Troposphere/ionosphere coupling: Distinguishing the sources of ionospheric disturbances, *11th International Symposium on Equatorial Aeronomy*, Taipei, Taiwan, 9-14 May, 2005.
- Mathews, J.D., S. Briczinski, D.D. Meisel, J.K. Breakall, M.P. Sulzer, P. Perillat, and E.I. Castro, An on-dish 430 MHz interferometer for radar meteor observations at Arecibo, *URSI National Radio Science Meeting*, Boulder CO, 4-8 January, 2005.

- Briczinski, S.J., C.-H. Wen, and J.D. Mathews, Recent automated-search meteor results from Arecibo 430 MHz radar observations, *URSI National Radio Science Meeting*, Boulder CO, 4-8 January, 2005.
- Wen, C.-H., J.F. Doherty, and J.D. Mathews, A report on current research regarding the meteor trail echo and hyper-speed meteor events using the Arecibo 430 MHz radar, *URSI National Radio Science Meeting*, Boulder CO, 4-8 January, 2005.
- Bauer, E.E., D.D. Meisel, K.M. Anne, M.T. Haas, J.D. Mathews, and S. Briczinski, Heliospheric modulation of Arecibo hyperbolic micrometeor rates, *Astronomical Society of New York*, Rensselaer Polytechnic Institute, Troy NY, Contributed Paper (23 October, 2004).
- Szasz, C., J. Kero, A. Pellinen-Wannberg, T. Aso, J.D. Mathews, and N.J. Mitchell, Latitudinal effects on meteor diurnal rates, *Meteoroids 2004*, London Ontario, contributed poster (15-20 August, 2004).
- Meisel, D.D., E. Bauer, K. Anne, M. Valites, B.D. Bartlett, S. Briczinski, J.D. Mathews, and D. Janches, Heliospheric modulation of the extrasolar micrometeors detected with the Arecibo UHF radar, *Meteoroids 2004*, London Ontario, Contributed, 10-4, (15-20 August, 2004).
- Wen, C.-H., J.F. Doherty, and J.D. Mathews, On the search of hyper-speed meteors, in *CEDAR Workshop*, Santa Fe, NM (27 June - 2 July, 2004).
- Briczinski, S.J., J.D. Mathews, and D.D. Meisel, Up in smoke? UHF radar meteor observations and the "terminal event." *CEDAR Workshop*, Santa Fe, NM (27 June - 2 July, 2004).
- Meisel, D.D., B.D. Bartlett, J.D. Mathews, D. Janches, and S. Briczinski, Why are hyperbolic micrometeoroids no longer detected with the Arecibo UHF radar? *204th American Astronomical Society Meeting*, Denver CO, contributed, 64.03 (30 May - 3 June, 2004).
- Briczinski, S.J., and J.D. Mathews, The application of an automated searching routine to sporadic meteor observations, *URSI National Radio Science Meeting*, Boulder CO, Contributed Presentation, G/H2-3 (5-8 January, 2004).
- Janches, D., M.C. Nolan, J.L. Chau, R.F. Woodman, J.D. Mathews, and D.D. Meisel, Micrometeor observations with the Arecibo and Jicamarca radars, *URSI National Radio Science Meeting*, Boulder CO, contributed presentation, G/H2-5 (5-8 January, 2004).
- Janches, D., M.C. Nolan, J.D. Mathews, and D.D. Meisel, A semi-annual study of the micrometeor influx in the mesopause, *2003 American Geophysical Union Fall Meeting*, San Francisco, contributed poster, SA41C-06 (8-12 December, 2003).
- Raizada, S., C.A. Tepley, D. Janches, J.S. Friedman, Q. Zhou, and J.D. Mathews, Simultaneous observations of neutral Ca and K metallic layers from Arecibo and the possible influence of micrometeoroids on sporadic layers, *2003 American Geophysical Union Fall Meeting*, San Francisco, contributed poster, SA41C-07 (8-12 December 2003).
- Pasko, V., S. Cummer, M. Stanley, J.D. Mathews, U. Inan, T. Wood, E. Williams, R. Boldi, M. Sato, and Y. Takahashi, Sprites produced by positive and negative lightning discharges above Haiti/Dominican Republic thunderstorms, *IEEE/APS/URSI North American Radio Science Meeting*, Columbus OH, Contributed, 122.2 (22-27 June 2003).
- Zhou, Q.-N., J.D. Mathews, Q. Du, and C.A. Miller, A preliminary investigation of the pseudo-spectral numerical solution of the Perkins instability equations, *IEEE/APS/URSI North American Radio Science Meeting*, Columbus, OH, contributed, 98-2 (22-27 June 2003).

- Mathews, J.D., D. Janches, D.D. Meisel, and Q.-H. Zhou, The atmospheric fate of 0.5-100 micron dust observed as radar micrometeors at Arecibo Observatory, *Astrophysics of Dust*, Estes Park CO, Poster, P2.19 (26-30 May, 2003).
- Meisel, D.D., D. Janches, and J.D. Mathews, Nearby stars as sources of Arecibo radar detected interstellar dust particles, *Astrophysics of Dust*, Estes Park CO, Poster, P2.18 (26-30 May, 2003).
- Briczinski, S.J., J.D. Mathews, C.-H. Wen, and J.F. Doherty, Observations of sporadic meteor events using the 430 MHz Arecibo Observatory radar, *CEDAR Workshop*, Longmont CO, poster (2003).
- Janches, D., D.D. Meisel, M.C. Nolan, B.D. Bartlett, J.D. Mathews, Q.-H. Zhou, and D.E. Moser, Orbital properties of micron-size dust determined using the Arecibo 430 MHz dual-beam radar, *Astrophysics of Dust*, Estes Park CO, Poster, P2.17 (26-30 May, 2003).
- Moser, D.E., D. Janches, D.D. Meisel, M.C. Nolan, B.D. Barlett, and J.D. Mathews, Monitoring the yearly sporadic micrometeor flux into the upper atmosphere using the Arecibo dual-beam 430 MHz radar, *American Astronomical Society Meeting 201*, Seattle WA, Contributed paper (5-9 January, 2003).
- Janches, D., D.O. ReVelle, J.D. Mathews, and D.D. Meisel, Observational and theoretical evidence of catastrophic disintegration of micrometeors: A new mechanism of meteoric mass deposition into the upper atmosphere, *Asteroids, Comets, & Meteors*, Berlin, Germany, contributed, 4-40 poster (29 July—2 August 2002).
- Janches, D., Q.-H. Zhou, D.D. Meisel, D.E. Moser, and J.D. Mathews, Monitoring the yearly sporadic micrometeor flux into the upper atmosphere using the Arecibo dual-beam 430 MHz radar: First results, *Asteroids, Comets, & Meteors*, Berlin, Germany, contributed, 4-39 oral/poster, 29 July – 2 August (2002).
- Mathews, J.D., J. Doherty, C.-H. Wen, D. Janches, and D.D. Meisel, Meteor science issues addressed via UHF radar meteor observations at Arecibo Observatory, *Asteroids, Comets, & Meteors*, Berlin, Germany, contributed poster, 4-23, 29 July – 2 August (2002).
- Briczinski, S., and J.D. Mathews, Development of a meteor interferometer for the 430 MHz Arecibo Observatory radar, *CEDAR Workshop*, Longmont, CO, contributed poster, 17-21 June (2002).
- Wen, C.-H., J.F. Doherty, and J.D. Mathews, Signal processing for meteor detection from Arecibo Observatory data, *CEDAR Workshop*, Longmont, CO, contributed poster, 17-21 June (2002).
- Zhou, Q.-N., J.D. Mathews, Q. Du, and C. A. Miller, A preliminary numerical investigation of the Perkins instability, *CEDAR Workshop*, Longmont, CO, contributed poster, 17-21 June (2002).
- Mathews, J. D., Radio science issues surrounding HF/VHF/UHF radar meteor studies, contributed paper URSI National Meeting, Boulder CO, 9-12 Jan (2002).
- Pasko, V. P., J. Mathews, M. Stanley, U. Inan, T. Wood, S. Gonzalez, Q. Zhou, M. Sulzer, and C. Tepley, “Studies of lightning and lightning induced ionospheric effects at Arecibo Observatory,” *2002 URSI National Radio Science Meeting, Program and Abstracts*, p. 291, Boulder, Colorado, January 9-12 (2002).

- Mathews, J. D., M. A. Stanley, V. P. Pasko, T. G. Wood, U. S. Inan, M. J. Heavner, "Electromagnetic signatures of the Puerto Rico blue jet and its parent thunderstorm," *American Geophysical Union 2002 Fall Meeting*, San Francisco, California, *EOS*, 83, N 47, p. F91 (6-10 December 2001).
- Mathews, J. D., D. Janches, D. D. Meisel, and Q.-H. Zhou, "Updated micrometeoroid mass flux results from Arecibo meteor observations," paper PSA-32, contributed, *Meteoroids 2001*, Kiruna, Sweden (6-10 August, 2001).
- Meisel, D. D., D. Janches, and J. D. Mathews, "The size distribution of Arecibo ISPs and its implications," paper 11.7, contributed, *Meteoroids 2001*, Kiruna, Sweden (6-10 August, 2001).
- Zhou, Q.-H., T. Nakamura, and J. D. Mathews, "Observations of field-aligned irregularities in meteor trails using the MU radar," paper 7.3, contributed, *Meteoroids 2001*, Kiruna, Sweden (6-10 August, 2001).
- Briczinski, S., D. Janches, and J.D. Mathews, Observed meteor altitude distribution and subsequent meteoric mass deposition in the upper atmosphere, *CEDAR Workshop*, Longmont CO, contributed poster, 17-22 June (2001).
- Zhou, Q.-N., and J.D. Mathews, ISR observations and simulations of the midnight collapse and related structures at Arecibo, *CEDAR Workshop*, Longmont CO, contributed poster, 17-22 June (2001).
- Zhou, Q.-H., J. D. Mathews, "Implications of meteor observations by the MU radar," paper contributed, *URSI US National Meeting*, Boulder CO (8-11 January 2001).
- Mathews, J. D., Q.-N. Zhou, and Q.-H. Zhou, "Arecibo ISR observations of horizontally-narrow, vertically-extended ionization sheets," paper contributed, *URSI US National Meeting*, Boulder CO (8-11 January 2001).
- Janches, D., J. D. Mathews, and D. D. Meisel, "A study of the Arecibo micrometeor entry kinetics in the upper atmosphere," paper Poster, *CEDAR 2000*, Boulder, CO (25-30 June 2000).
- Mathews, J. D., D. Janches, D. D. Meisel, and Q.-H. Zhou, "Arecibo radar studies of micrometeors: Zodiacal and interstellar dust in the solar system and the atmospheric fate of this dust," paper contributed, *Eighth Workshop on the Physics of Dusty Plasmas*, Santa Fe (26-28 April, 2000).
- Mathews, J. D., D. Janches, and D. D. Meisel, "Direct determination of the micrometeoroid mass flux into the upper atmosphere," paper 8.43, contributed, *IAU Colloquium 181/COSPAR Colloquium 11—Dust in the solar system and other planetary systems*, Canterbury UK (10-14 April, 2000).
- Janches, D., D. D. Meisel, and J. D. Mathews, "Dynamical and orbital properties of the Arecibo micrometeors," paper 1.2, contributed, *IAU Colloquium 181/COSPAR Colloquium 11—Dust in the solar system and other planetary systems*, Canterbury UK (10-14 April, 2000).
- Mathews, J. D., Q.-H. Zhou, D. Janches, and D. D. Meisel, "Direct Determination of the Meteoroid Mass Flux into the Upper Atmosphere," paper Contributed, *URSI National Radio Science Meeting*, Boulder, CO (5-8 January 2000).



- Meisel, D. D., D. Janches, and J. D. Mathews, "Interstellar Particles Detected with the Arecibo 430 MHz Radar," paper contributed, Asteroids, Comets, and Meteors, Cornell (26-30 July, 1999).
- Mathews, J. D., D. Janches, D. D. Meisel, and Q.-H. Zhou, "Radar Micrometeors: Physical Processes and the Radar Scattering Mechanism," paper contributed, Asteroids, Comets, and Meteors, Cornell (26-30 July, 1999).
- Mathews, J. D., D. Janches, D. D. Meisel, and Q.-H. Zhou, "An Overview of Radar Micrometeor Observations at Arecibo Observatory," paper contributed, Asteroids, Comets, and Meteors, Cornell (26-30 July, 1999).
- Janches, D., J. D. Mathews, D. D. Meisel, and Q.-H. Zhou, "Radar Micrometeors: II. Details on the determination of meteor sizes and masses derived by comparing numerical modeling and experimental data," paper contributed, Asteroids, Comets, and Meteors, Cornell (26-30 July 1999).
- Janches, D., J. D. Mathews, D. D. Meisel, and Q.-H. Zhou, "Radar micrometeors: I. Overview of the Doppler velocity and deceleration results from Arecibo," paper contributed, Asteroids, Comets, and Meteors, Cornell (26-30 July 1999).
- Zhou, Q.-N., J. D. Mathews, and Q.-H. Zhou, "F-region tilt observed over Arecibo," poster paper CEDAR-99, Boulder, CO (13-18 June 1999).
- Mathews, J. D., D. Janches, Q.-N. Zhou, and Q.-H. Zhou, "Meteoric deposition of metals and subsequent transport of metal ions in the E-region," contributed paper, CEDAR-99, Boulder, CO (13-18 June 1999).
- Janches, D., J. D. Mathews, D. D. Meisel, and Q.-H. Zhou, "Highlights of radar meteor science at Arecibo," paper CEDAR-99, Boulder, CO (13-18 June, 1999).
- Zhou, Q.-H., J. D. Mathews, and Q.-N. Zhou, "Incoherent scatter radar study of the impact of meteoric flux on E-region ionization," contributed paper, URSI National Radio Science Meeting, Boulder, CO (4-8 January 1999).
- Mathews, J. D., D. D. Meisel, D. Janches, V. S. Getman, and Q.-H. Zhou, "Direct Doppler and scattering mechanism studies of meteor head-echoes using the Arecibo 50/430 MHz radars," contributed, Meteoroids 1998, Tatranska Lomnica, Slovakia (17-21 August 1998).
- Mathews, J. D., D. D. Meisel, D. Janches, V. S. Getman, and Q.-H. Zhou, "Possible origins of low inclination antapex micrometeors observed using the Arecibo UHF radar," contributed, Meteoroids 1998, Tatranska Lomnica, Slovakia (17-21 August 1998).
- Mathews, J. D., D. W. Machuga, Q. Zhou, and G. D. Earle, "Spread-F, ion rain, and the intermediate layer," URSI National Radio Science Meeting, Boulder, CO (5-9 January 1998).
- Zhou, Q.-H., P. Perillat, J. Y. N. Cho, and J. D. Mathews, "Simultaneous meteor observations by power UHF and VHF radars," 1997 IEEE AP-S International Symposium and URSI Radio Science Meeting, Montreal, Canada (July 1997).
- Meisel, D. D., T. S. Allen, V. S. Getman, J. D. Mathews, and Q. Zhou, "Dynamical studies of micrometeors detected at the Arecibo Observatory," 29th Annual Meeting of the Division of Planetary Studies of the American Astronomical Society, Cambridge, Mass. (28 July-1 August, 1997).

- Machuga, D. W., T. J. Kane, T. F. Wheeler, C. L. Croskey, J. D. Mathews, and J. D. Mitchell, "The CSSL (Combined Sporadic Structures and Layers) Payload: In situ Observations of Mesospheric Sodium and Related Parameters," 13th ESA Symposium on European Rocket and Balloon Programmes and Related Research, Oland, Sweden (May 26-29, 1997).
- Mathews, J. D., M. P. Sulzer, and P. Perillat, "High resolution ISR studies of layers and waves in the 80-200 km altitude region above Arecibo," AGU 1994 Fall Meeting, San Francisco CA (Dec. 5-9, 1994).
- Kane, T. J., J. D. Mathews, K. P. Hunter, D. W. Machuga, and J. Yu. "Comparison of narrow sodium layer results from AIDA-89 and ALOHA-90." 30th COSPAR Scientific Assembly, Hamburg, Germany (1994).
- Hunter, K. P., J. Yu, J. D. Mathews and T. J. Kane, "Some Properties of the 5-6 April 1989 Wave Event Observed During AIDA," Poster Paper, CEDAR 1993 Meeting, Boulder, CO (June 1993)
- Zhou, Q., J. D. Mathews, and C. S. Gardner, "The Roles of Tides and Gravity Waves on the Formation of Sporadic Sodium Events Based on the Simultaneous Lidar/Radar Observations During the AIDA Campaign," European Geophysical Society Meeting, Edinburgh, Scotland (April 6-11, 1992).
- Zhou, Q., and J. D. Mathews, "Detection and Correction of Coherent Interference in Incoherent Scatter Radar Data Processing," Spring American Geophysical Union 1991 Spring Meeting, Baltimore, MD (May 28-June 1, 1991).
- Morton, Y. T., J. D. Mathews, and Q. Zhou, "Electron Concentration Configurations During the March 13-14, 1989 Geomagnetic Storm as Measured by Arecibo Incoherent Scatter Radar," American Geophysical Union 1991 Spring Meeting, Baltimore, MD (May 28-June 1, 1991).
- Zhou, Q., Y. T. Morton, J. D. Mathews, C. R. Philbrick, T. J. Beatty and C. S. Gardner, "Correlation Study of Sodium and Electron Concentrations above Arecibo," Poster Paper, CEDAR 1990 Meeting, Boulder, Co. (June 1990).
- Rau, Y. C., J. D. Mathews, C. R. Philbrick, T. J. Beatty, R. E. Bills and C. S. Gardner, Gravity Wave Activity Variation over Arecibo during the AIDA Campaign," Poster Paper, CEDAR 1990 Meeting, Boulder, Co. (June 1990).
- Morton, Y. T., Q. Zhou and J. D. Mathews, "Tides and Gravity Waves in the Formation and Motion of E-Region Ion Layers," Poster Paper, CEDAR 1990 Meeting, Boulder, Co. (June 1990).
- Rau, Y. C., J. E. Mancusi, J. D. Mathews, C. R. Philbrick, C. S. Gardner and T. J. Beatty, "Seasonal Variation of Middle Atmosphere Gravity Wave Activity Over Arecibo During the AIDA Campaign," Poster Paper, Spring AGU, Baltimore, Md. (May 29-June 1, 1990).
- Morton, Y. T., J. D. Mathews and Q. Zhou, "Tides and Acoustic-Gravity Waves as Observed in the Motions of Ionospheric E Region Meteoric Ion Layers During AIDA," Poster Paper, Spring AGU, Baltimore, Md. (May 29-June 1, 1990).
- Mathews, J. D., C. R. Philbrick, Q. Zhou, C. S. Gardner and T. J. Beatty, "Simultaneous Observations of Narrow Sodium and Narrow Ionization Layers Using Both Lidar and Incoherent Scatter Radar Techniques at Arecibo During AIDA," Contributed Paper, Spring AGU, Baltimore, Md. (May 29-June 1, 1990).

- Chang, S. S., Y. C. Rau, J. D. Mathews, C. R. Philbrick, C. S. Gardner and T. J. Beatty, "Latitudinal Variations of Middle Atmospheric Structure for Winter and Spring Seasons," Poster Paper, Spring AGU, Baltimore, Md. (May 29-June 1, 1990).
- Beatty, T. J., R. E. Bills, C. A. Hostetler, C. S. Gardner, Q. Zhou, J. D. Mathews and C. R. Philbrick, "Lidar and Radar Observations of Sporadic E and Sporadic Na Layers at Arecibo," Contributed Paper, Spring AGU, Baltimore, Md. (May 29-June 1, 1990).
- Ying, W.-P., J.D. Mathews and C.A. Tepley, "Thermal Structure Near the 85 km Mesopause Region Inferred from OH(8-3) and OH(5-1) Rotational Band Emissions," paper presented at the spring American Geophysical Union Meeting, Baltimore, Md. (13-19 May 1986).
- Ying, W.-P. and J.D. Mathews, "Observations of the Tidal Motions in the 80 to 150 km Altitude Region at Arecibo," paper presented at the spring American Geophysical Union Meeting, Baltimore, Md. (13-19 May 1986).
- Breakall, J.K., J.D. Mathews, and M.P. Sulzer, "The Moon as a Calibration Target of Convenience for VHF-UHF Radar Systems," paper given at the URSI National Radio Science Meeting, Boulder, Co. (13-16 Jan., 1986).
- Ying, W.P., J.D. Mathews, and P.K. Rastogi, "Interference Detection and Correction Applied to Incoherent Scatter Radar Power Spectrum Measurements", paper presented at the URSI/SCOSTEP Workshop on MST Radars, Aquadilla, Puerto Rico (Oct. 1985).
- Rastogi, P.K., J.D. Mathews and J. Rüttger, "Simultaneous D Region VHF Observations at Arecibo during a Solar Flare: A Check on the Gradient Mixing Hypothesis," paper presented at the URSI/SCOSTEP Workshop on MST Radars, Aguadilla, Puerto Rico (Oct. 1985).
- Rastogi, P.K. and J.D. Mathews, "Usefulness of Multifrequency MST Radar Measurements" paper presented at the URSI/SCOSTEP Workshop on Technical Aspects of MST Radar, University of Illinois, Urbana, (May 1984).
- Tepley, C.A., J.D. Mathews and S. Ganguly, "Ion-neutral Collision Frequencies and Temperatures Derived from Incoherent Scatter Radar Observations of the Lower Ionosphere," paper presented at the Fourth Scientific Assembly of the International Association of Geomagnetism and Aeronomy (IAGA), Edinburgh, Scotland (August 1981).
- Mathews, J.D., M.P. Sulzer, C.A. Tepley, R. Bernard, J.L. Fellous, M. Glass, M. Massebeauf, S. Ganguly, R.M. Harper, R.A. Behnke and J.C.G. Walker, "A Comparison Between Thomson Scatter and Meteor Radar," presented at the 6th International Symposium on Equatorial Aeronomy, Aquadilla, Puerto Rico (1980).
- Tepley, C.A., J.D. Mathews, R.G. Burnside and J.W. Meriwether, Jr., "Horizontal Thermal Structure of the Mesosphere," presented at the Spring American Geophysical Union Meeting, Toronto (1980).
- Mathews, J.D. and S. Ganguly, "Observations of Negative Ions in the Mesosphere," presented at the fall American Geophysical Union Meeting, San Francisco (December 1978).
- Meriwether, J.M., Jr., D.P. Sipler, M.A. Biondi and J.D. Mathews, "Observations of the Mesosphere Temperature Over Arecibo from Airglow and Incoherent Scatter Measurements," presented at the fall American Geophysical Union Meeting, San Francisco (December 1977).
- Mathews, J.D. "Barker Coded Radar Measurements of a Continuous Scattering Medium", NAIC Report #47 (1975).

**Theses co-Directed (External Universities):**

Gutierrez, P.F., The Installation and Scientific Use of a Microbarograph at Arecibo Observatory, MSc thesis, Umeå University, Kiruna, Sweden, 2004.

Wiig, J., State of the Art All-Sky Imaging System at Arecibo Observatory: Data Acquisition, Scientific Uses, and Web-Publishing, MSc thesis, Umeå University, Kiruna, Sweden, 2004.

**Theses Directed (Penn State University):**

Malhotra, A. (PhD 2009), Solving Long-Standing Meteor Mysteries.

Seker, I. (PhD 2009), The Properties and 3D Structure of Medium Scale Traveling Ionospheric Disturbances.

Livneh, D. J. (PhD 2009), Coherent Omnipresent Fluctuations in the Ionosphere.

Seker, I. (M.S. 2006), Categorization and Analysis of the Significant Results from the Penn State AllSky Imager at Arecibo.

Malhotra, A. (M.S. 2006), Effect of Meteor Echoes on E-Region Field Aligned Irregularities.

Briczinski, S.J., (Ph.D. 2006) Automated UHF Radar Observations of Meteors with Aeronomical Applications.

Wen, C.-H. (Ph.D. 2005) Time-Frequency Signal Processing Techniques for Radar Remote Sensing.

Zhou, Q.-N. (Ph.D. 2005) A Numerical Investigation of the Perkins Instability Equations by the Pseudo-Spectral Method.

Janches, D., (Ph.D. 2000) Physical and Orbital Properties of Micrometeors Observed Using the 430 MHz Arecibo Observatory Radar.

Zhou, Q.-N., (M.S. 2000) Horizontal Inhomogeneous Structures in the F Region Over Arecibo.

Rajan, S., (Ph.D. 1998) Statistical Retrieval of Water Vapor Profiles Using Zenith Pointing and Off-axis 22 GHz Radiometer Measurements.

Machuga, D. W., (Ph.D. 1997) Investigation of Fine Scale Structure in the Ionosphere.

Hunter, K., (Ph.D. 1996) Electromagnetic scattering from a thermalized plasma with a stochastic production-loss process.

Zhou, Q.-H. (Ph.D. 1991) A Joint Study of the Lower Ionosphere by Radar, Lidar, and Spectrometer During AIDA.

Morton, Y.T. (Ph.D. 1991) Ion Layers, Tides, Gravity Waves, and Electric Fields in the Upper Atmosphere Inferred from Arecibo Incoherent Scatter Radar Measurements.

Driggs, Stan, Pulse Compression Codes with Desirable Autocorrelation Functions, Senior Honors Thesis, PSU, May, 1990.

**Theses Directed (Case Western Reserve University):**

- Ying, W.P. (Ph.D. 1987), Investigation of Ionospheric D Region Aeronomy Using Incoherent Scatter Radar and Optical Measurements.
- Breakall, J.K. (Ph.D. 1983), On the Absolute Calibration and Theoretical Justification of High Resolution Ionospheric Results Obtained From Arecibo Radar Measurements.
- Tepley, C.A. (Ph.D. 1981), An Investigation of Temperature and Metallic Composition of the Lower Ionosphere.
- Tong, Y. (M.S. 1987), Quasi-Quarterdiurnal Tide and E-Region Ion Layer Motion
- Roder, P. (M.S. 1985), Absolute Determination of the Arecibo 430 MHz Radar System Constant.
- Ying, W.-P. (M.S. 1985), Analysis of the D-Region Incoherent Scatter Ion Line Power Spectra.
- German, M. (M.S. 1985), Interference Detection and Correction while Performing Ionospheric Studies with an Incoherent Scatter Radar.
- Tucker, T. (M.S. 1983), A Computer Model of Sporadic Ion Layers in the E-Region of the Ionosphere.
- Webster, R.B. (M.S. 1981), The Development of a Numerical Model of the Nocturnal F-Region.
- Bekeny, F.S. (M.S. 1979), Motion of Sporadic-E Layers in a Tidal Wind System.
- Tepley, C.A. (M.S. 1978), Ion-Neutral Collision Frequencies and Mean Temperatures in the Arecibo D-Region.
- Skaras, John (M.S. 1975), Wave Phenomena in the Lower Thermosphere Above Arecibo (co-directed with B.S. Tanenbaum).

**Post-Doctoral Associates:**

- S. Ganguly (1979-1980), now CEO of the Center for Remote Sensing, McLean, VA.
- M.P. Sulzer (1980-1981), now staff scientist at Arecibo Observatory.
- D. Janches (2001-2003), now at the Goddard Space Flight Center..
- Qina Zhou (2005-9/2006 ), now at Arizona State University & Goodyear.
- C.-H. Wen (2005-3/2007), returned to National Taiwan University to work with N. E. Huang.
- S. J. Briczinski (2006-2007), now at the Naval Research Lab.
- A. Malhotra (2009-2010) now Deputy Director, Symbiosis Institute of Technology, Pune India.
- Sumanta Sarkhel (2011- ) at Arecibo Observatory.