

## Michael E. Mauel

Department of Applied Physics and Applied Mathematics  
210 S. W. Mudd Building  
Columbia University  
New York, New York 10027  
(212) 854-4455  
<mailto:mauel@columbia.edu>  
<http://www.columbia.edu/~mem4>

## Education

Sc.D. (EE) 1983, Massachusetts Institute of Technology  
M.S. (EE) 1979, Massachusetts Institute of Technology  
B.S. (EE) 1978, Massachusetts Institute of Technology

## Experience

Professor, Applied Physics, Columbia University, 1995 to present  
Chairman, Dept. of Applied Physics and Applied Mathematics, 2000 to 2006  
Visiting Scientist, Massachusetts Institute of Technology, 1999 to present  
Visiting Scientist, General Atomics, San Diego, July 1994 – December 1994  
Associate Professor, Dept. of Applied Physics, Columbia University, July 1990 – July 1995  
Assistant Professor, Dept. of Applied Physics, Columbia University, August 1985 – July 1990  
Instructor, Dept. of Electrical Engineering, M. I. T., February 1984 – June 1984  
Research Scientist, Plasma Fusion Center, M. I. T., October 1982 – July 1985

## Honors and Awards

Jefferson Science Fellow, National Academies, U.S. Dept. of State, 2006-2007  
Certificate of Appreciation, U.S. Dept. of State, 2007  
Rose Award for Excellence in Fusion Engineering, Fusion Power Associates, 2000  
Fellow, American Physical Society, 1995  
Teacher of the Year, 1994, elected by Columbia's School of Engineering Undergraduates  
Certificate of Appreciation, U.S. Dept. of Energy, 1989  
I.E.E.E. Fortesque Fellowship (1978 – 1979)  
Guillemín Prize for undergraduate thesis in Electrical Engineering

## University Service

Chair, FFSEAS Faculty Governance Committee, 2011 to 2013  
Chairman, Dept. Applied Physics and Applied Mathematics, Columbia University, 2000-2006  
Member, FFSEAS Board of Visitors, 2009 to 2013  
Member, Faculty Task Force on CVN and Online Education, 2013 to 2014  
Member, FFSEAS Strategic Planning Committee, 2010 to 2012  
Member, Executive Committee, Graduate School Arts and Sciences, 2007 to 2011  
Member, Provost's Tenure Advisory Committee, 2007 to 2011  
Member, Science and Technology Policy Committee, 2007 to 2010  
Member, Faculty Advisory Committee for NWC Building, 2007 to 2010  
Chairman, Visiting Committee, University of Maryland, IREAP, 2010  
Visiting Committee, MIT Department of Nuclear Engineering, 2001-04

Faculty Advisor, Tau Beta Pi, Columbia University Chapter, 1989-1999  
President, University Fusion Association, 1997-1998,  
Secretary/Treasurer, 1992 – 1996; Executive Committee, 1992-94, 2014-present  
Chairman, Selection Committee, National Fusion Energy Undergraduate Fellows, 1994-95, 1997  
Selection Committee, Presidential Faculty Teaching Award, 1995  
Selection Committee, Presidential Graduate Student Teaching Award, 1996, 1997 (Chair)  
Elected University Senator, 1986-88, 1995-98  
Member, School of Engineering, Strategic Planning Committee, 1992 to 1993.  
Member, School of Engineering Dean of Students Search Committee, 1991 to 1992.

## Professional Society Service

Chair, APS Rosenbluth Dissertation Award Selection Committee, 2014; Vice-Chair, 2013  
Chair, APS Excellence in Plasma Physics Award Selection Committee, 2011; Vice-Chair 2010  
American Physical Society-DPP Program Committee, 2011, 2003, 2002 (Chair), 2001, 1997, 1990  
Member, Fellowship Committee, American Physical Society, 2006 to 2009  
Member, 50<sup>th</sup> Anniversary Program Committee for APS-DPP, 2007-2008  
Chair, APS James Maxwell Prize Selection Committee, 2007; Vice-Chair, 2006  
Chair, Division of Plasma Physics, American Physical Society, 2002-03  
Chair-Elect, Vice-Chair, Division of Plasma Physics, American Physical Society, 2001-02  
Chair, American Physical Society-DPP Fellowship Committee, 2001; Member, 1997, 2005-2007  
Member, Program Committee, European Physical Society Meeting, 2003  
Member, Executive Committee of the Div. of Plasma Physics of APS, 1989 - 1990

## National and International Professional Experience

Associate Editor, *Physics of Plasmas*, 2003-present  
Associate Editor, *Journal of Fusion Energy*, 2014-present  
Guest Editor, *Special Issue: Strategic Opportunities in Fusion Energy, JOFE*, 2014-present  
Guest Editor, *Special Issue: Mixing in Fusion Plasmas, Physica Scripta*, 2014.  
Associate Editor, *Physical Review Letters*, 1995-1998  
Chair, Plasma Science Committee, National Research Council; Member from 2007-2010, 2010-2012  
(Vice-Chair), 2012-2014 (Chair)  
Chair, U.S. Burning Plasma Council, 2010-2013; Member from 2009-2013  
Member, Natural Sciences and Engineering Research Council of Canada (NSERC), Physics  
Evaluation Group, 2012-2015  
Plasma Physics Advisory Committees,  
PPPL NSTX 2004-Present; Chair 2007 to 2011  
MIT C-Mod 1999-2003, Chair 2002-03;  
HIF-VNL 2002-2007;  
VLT 1998-2001; DIII-D 1996-1998; PBX-M 1995-1996.  
Chair, U.S. ITER Forum, U. Maryland, May, 2003  
Co-Chair, 1999 Fusion Summer Study, Snowmass, CO, July 1999.  
Member, US DOE FESAC Advisory Committees:  
Fusion Major Facilities, 2012-2013  
Fusion Priorities, 2003-2004; 2012-2013  
Pathway to DEMO, 2007  
Committee of Visitors, 2003, 2004;  
Integrated Program Planning, 1999-2001;

Fusion Program and Balance Panel, 1999;  
Fusion Materials Committee, 1997-1998;  
FEAC Alternative Concepts Committee, 1996;  
FEAC Strategic Planning Committee, 1995-96.  
Member, DOE Fusion Science Center Selection Panel, 2004  
Member NSF Basic Plasma Physics Selection Panel, 2003, 2005  
Member, NSF Physics Frontiers Selection Panel, 2001, 2002  
Member, U. S. Dept. of Energy, I.A.E.A. Paper Selection Review Panel, 1994, 1990.  
Member, Program Committee, 2nd International Workshop on Interrelationship Between Plasma Experiments in Laboratory and Space, 1993  
Member, Innovations in Tokamak Improvements and New Fusion Confinement Systems Evaluation Committee, U.S. Dept. of Energy, 1993  
Consultant, Fusion Systems, Inc., Maryland, 1991  
Member, Executive Committee of the Div. of Plasma Physics of APS, 1989 - 1990  
Member, U. S. Dept. of Energy, TFTR D-T Fusion Review Panel, 1990  
Member, NSF, Small Business Innovative Research Program Selection Committee, 1990  
Consultant, NSF, Selection of Presidential Young Investigator Awards, 1989  
Chairman, U. S. Dept. Energy, CDX-U Review Panel, 1989  
Consultant, U. S. Congressional O. T. A., Fusion Energy Review Panel, November 1986  
Consultant, Plasma Fusion Center, M. I. T., August 1985 – December 1986

## Peer-Reviewed Publications

“Local Regulation of Interchange Turbulence in a Dipole-Confined Plasma Torus using Current-Collection Feedback,” T. M. Roberts, M. E. Mauel, and M. W. Worstell, to appear in *Physics of Plasmas*, (May, 2015)

“Active and passive kink mode studies in a tokamak with a movable ferromagnetic wall,” J.P. Levesque, P.E. Hughes, J. Bialek, P.J. Byrne, M.E. Mauel, G.A. Navratil, Q. Peng, D.J. Rhodes and C.C. Stoafer, to appear in *Phys. of Plasmas*, (May, 2015).

“High-Speed Imaging of the Plasma Response to Resonant Magnetic Perturbations in HBT-EP,” Sarah M. Angelini, Jeffrey P. Levesque, Michael E. Mauel, Gerald A. Navratil, *Rev. Sci. Instr.*, **57**, 045008, (2015)

“Pressure profiles of plasmas confined in the field of a magnetic dipole”, M.S. Davis, M.E. Mauel, D.T. Garnier, and J. Kesner, *Plasma Physics and Control Fusion*, **56**(9), 095021, (2014).

“Fast, Multi-Channel Real-Time Processing of Signals with Microsecond Latency using GPU Computing”, N. Rath, S. Kato, J.P. Levesque, M.E. Mauel, G.A. Navratil, and Q. Peng, *Rev. Sci. Instruments*, **85**(4) 045114 (2014).

“Measurement of 3D plasma response to external magnetic perturbations in the presence of a rotating external kink,” D Shiraki, Sarah Angelini, J. Bialek, P J Byrne, B DeBono, P. Hughes, J P Levesque, M E Mauel, N Rath, G A Navratil, Q. Peng, D. Rhodes, and C. Stoafer, *Physics of Plasmas* **20** (10), 102503 (2013).

“Adaptive Control of Rotating Magnetic Perturbations in HBT-EP using GPU Processing,” N Rath, S. Angelini, J. Bialek, P J Byrne, B DeBono, J P Levesque, M E Mauel, G A Navratil, Q. Peng, D. Rhodes, and C. Stoafer, *Plasma Phys and Controlled Fusion* **55** (8), 084003 (2013).

“Adaptive feedback control of rotating external kink modes in HBT-EP”, N Rath, S. Angelini, J. Bialek, P J Byrne, B DeBono, J P Levesque, M E Mauel, G A Navratil, Q. Peng, D. Rhodes, and C. Stoafer, *Nuclear Fusion* **53** (7), 073052 (2013).

“Multimode observations and 3D magnetic control of the boundary of a tokamak plasma,” J P Levesque, N Rath, D Shiraki, Sarah Angelini, J. Bialek, P J Byrne, B DeBono, P. Hughes, M E Mauel, G A Navratil, Q. Peng, D. Rhodes, and C. Stoafer, *Nuclear Fusion* **53** (7), 073037 (2013).

“In-Situ ‘Artificial Plasma’ Calibration of Tokamak Magnetic Sensors,” D Shiraki, J P Levesque, J. Bialek, P J Byrne, B DeBono, M E Mauel, D. Maurer, G A Navratil, T.S. Pedersen, and N. Rath, *Rev Scientific Instruments*, **84** (6) 063502 (2013).

“High-speed, multi-input, multi-output control using GPU processing in the HBT-EP tokamak,” N Rath, J. Bialek, P J Byrne, B DeBono, J P Levesque, M E Mauel, D A Maurer, G A Navratil, and D Shiraki, *Fus. Engineering and Design*, **87** 1895 (2012).

“High resolution detection and excitation of resonant magnetic perturbations in a wall-stabilized tokamak,” D A Maurer, D Shiraki, J P Levesque, J. Bialek, Sarah Angelini, P J Byrne, B DeBono, P. Hughes, M E Mauel, G A Navratil, Q. Peng, D. Rhodes, N Rath, and C. Stoafer, *Phys. Plasmas*, **19**, 056123 (2012).

"Fluctuation Driven Transport and Stationary Profiles," J. Kesner, D.T. Garnier, and M.E. Mauel, *Phys. of Plasmas*, **18**, 050703 (2011).

“The high beta tokamak-extended pulse magnetohydrodynamic mode control research program,” D A Maurer, J Bialek, P J Byrne, B De Bono, J P Levesque, B Q Li, M E Mauel, G A Navratil, T S Pedersen, N Rath and D Shiraki, *Plasma Physics and Contr. Fusion*, **53**, 074016 (2011).

"A high-power spatial filter for Thomson scattering stray light reduction," J. P. Levesque, K. D. Litzner, M. E. Mauel, D. A. Maurer, G. A. Navratil, and T. S. Pedersen, *Rev. Sci. Instr.*, **82**, 033501 (2011).

“Transport Induced by Large Scale Convective Structures in a Dipole-Confined Plasma,” Grierson, B.A.; Mauel, M.E.; Worstell, M.W.; Klassen, M., *Physical Review Letters*, **105**, 205004 (2010).

“Stationary density profiles in the levitated dipole experiment: toward fusion without tritium fuel,” Kesner, J.; Davis, M.S.; Ellsworth, J.L.; Garnier, D.T.; Kahn, J.; Mauel, M.E.; Michael, P.; Wilson, B.; Woskov, P.P., *Plasma Physics and Controlled Fusion*, **52**, 124036 (2010).

“Millimeter-wave radiometer diagnostics of harmonic electron cyclotron emission in the Levitated Dipole Experiment,” Woskov, P.P.; Kesner, J.; Garnier, D.T.; Mauel, M.E., *Review of Scientific Instruments*, **81**, 10D910 (2010).

“28 GHz Gyrotron ECRH on LDX”, P. P. Woskov, J. Kesner, P. C. Michael, D. T. Garnier, and M. E. Mauel, *Journal of Fusion Energy*, **29**, 588-591 (2010).

“Turbulent inward pinch of plasma confined by a levitated dipole magnet”, Boxer, A. C. Bergmann, R. Ellsworth, J. L. Garnier, D. T. Kesner, J., Mauel, M. E. Woskov, P., *Nature-Physics*, **6**, pp. 207-212 (2010).

“Observations and modeling of the electron cyclotron emission background in the Levitated Dipole Experiment,” Woskov, P.P.; Kesner, J.; Garnier, D.T.; Mauel, M.E.; Nogami, S.H. *Journal of Physics: Conference Series*, **227**, 012021 (2010).

“137 and 165 GHz radiometer measurements of hot electrons in LDX”, Garnier, D.T., Kesner, J.; Mauel, M.E.; Woskov, P., *IEEE 36th International Conference on Plasma Science (ICOPS)*, (2009).

“A Kalman filter for feedback control of rotating external kink instabilities in the presence of noise”. J. M. Hanson, B. De Bono, J. Levesque, M. E. Mauel, A. Maurer, G. A. Navratil, T. S. Pedersen, D. Shiraki, R. James, *Phys Plasmas* **16** (2009).

“Global and local characterization of turbulent and chaotic structures in a dipole-confined plasma.” B. A. Grierson, M. W. Worstell, and M. E. Mauel, *Phys Plasmas* **16** (2009) 055902.

“Confinement Improvement with Magnetic Levitation of Superconducting Dipole,” D. T. Garnier, A.C. Boxer, J.L. Ellsworth, J. Kesner, and M. E. Mauel, *Nuclear Fusion*, **49** (2009) 055023.

“Multichannel microwave interferometer for the levitated dipole experiment,” Boxer A, Garnier D, Mauel M, *Rev Sci Instrum*, **80** (2009) 043502.

“A digital control system for external magnetohydrodynamic modes in tokamak plasmas. J. M. Hanson, A. Klien, M. E. Mauel, A. Maurer, G. A. Navratil, T. S. Pedersen, *Rev Sci Instrum* **80** (2009) 043503.

“Feedback suppression of rotating external kink instabilities in the presence of noise.” Hanson J, De Bono B, James R, Levesque J, Mauel M, Maurer D, Navratil G, Pedersen T, Shiraki D, *Phys Plasmas* **15** (2008) 080704

“Control of External Kink Modes Near the Ideal Wall Limit Using Kalman Filtering and Optimal Control Techniques,” D. A. Maurer, J. Bialek, A. H. Boozer, B. Debono, J. M. Hanson, R. James, J. P. Levesque, O. Katsuro-Hopkins, M. E. Mauel, G. A. Navratil, T. S. Pedersen and D. Shiarki, 22nd IAEA Conference of Plasma Physics and Controlled Nuclear Fusion, (2008).

“Experiments and Modeling of External Kink Mode Control Using Modular Internal Feedback Coils,” T. Sunn Pederson, D. A. Maurer, J. Bialek, O. Katsuro-Hopkins, J. Hansen, M. E. Mauel, R. James, A. Klien, Y. Liu, and G. A. Navratil, *Nuclear Fusion* **47** (2007) 1293.

“Density profiles in the levitated dipole experiment,” Boxer, A.C., Garnier, D.T.; Ellsworth, J.L.; Kesner, J.; Mauel, M.E., *Journal of Fusion Energy*, **27**, p 11-15, (2008)

“Stabilization of Low Frequency Instability in a Dipole Plasma,” D. T. Garnier, A. K. Hansen, M. E. Mauel, E. E. Ortiz, A. C. Bozer, J. L. Ellsworth, I. Karim, and J. Kesner, *J. Plasma Phys.*, **74** (2008) 737.

“Equilibrium Reconstruction of Anisotropic Pressure Profile in the Levitated Dipole Experiment,” I. Karin, M. Mauel, J. Ellsworth, A. Boxer, D. Garnier, A. Hansen, J. Kesner, E. Ortiz, *J. Fusion Energy*, **26** (2007) 99.

“Effects of the Hot Electron Interchange Instability on a Plasma Confined in a Dipolar Magnetic Field,” E. Ortiz, A. Boxer, J. Ellsworth, D. Garnier, A. Hansen, J. Kesner, M. Mauel, *J. Fusion Energy*, **26** (2007) 139.

“Varying Electron Cyclotron Resonance Heating on the Levitated Dipole Experiment,” A. Hansen, A. Boxer, J. Ellsworth, D. Garnier, J. Kesner, M. Mauel, E. Ortiz, *J. Fusion Energy*, **26** (2007) 57.

“Quench detection for the levitated dipole experiment (LDX) charging coil,” P. C. Michael and D. T. Garnier and A. Radovinsky and I. Rodin and V. Ivkin and M. E. Mauel and V. Korsunsky and S. Egorov and A. Zhukovsky and J. Kesner, *IEEE Trans. Appl. Supercond.* **17** (2007) 2482.

“Design and initial operation of the LDX facility,” Garnier, D.T., Hansen, A.K.; Kesner, J.; Mauel, M.E.; Michael, P.C.; Minervini, J.V.; Radovinsky, A.; Zhukovsky, A.; Boxer, A.; Ellsworth, J.L.; Karim, I.; Ortiz, E.E. *Fusion Engineering and Design*, **81**, (2006), p 2371-2380

“Production and Study of High-Beta Plasma Confined by a Superconducting Dipole Magnet,” Garnier, A. Hansen, M. Mauel, E. Ortiz, A. Boxer, I. Karin, J. Kesner, S. Mahar, A. Roach, *Physics of Plasmas*, **13** (2006) 056111.

“First integrated test of the superconducting magnet systems for the Levitated Dipole Experiment (LDX)”, Zhukovsky, A., Michael, P.C.; Schultz, J.H.; Smith, B.A.; Minervini, J.V.; Kesner, J.; Radovinsky, A.; Garnier, D.; Mauel, M. *Fusion Engineering and Design*, **75-79**, (2005), p 29-32

“Suppression of rotating external kink instabilities using optimized mode control feedback,” A. Klein, D. Maurer, T. Pedersen, M. Mauel, G. A. Navratil, C. Cates, M. Shilov, Y. Liu, N. Stillits and J. Bialek, *Phys. Plasmas*, **12** (2005), 40703.

“Excitation of Centrifugally Driven Interchange Instabilities in a Plasma Confined by a Magnetic Dipole,” B. Levitt, D. Maslovsky, M. Mauel, J. Waksman, *Phys. Plasmas*, **12**, (2005), 55703.

“Observation of Centrifugally Driven Interchange Instabilities in a Plasma Confined by a Magnetic Dipole,” B. Levitt, D. Maslovsky, M. Mauel, *Phys. Rev. Lett.* , **94**, (2005), 175002.

“Dynamics and control of resistive wall modes with magnetic feedback control coils: experiment and theory,” M.E. Mauel, J. Bialek, A.H. Boozer, C. Cates, R. James, O. Katsuro-Hopkins, A. Klein, Y. Liu, D.A. Maurer, D. Maslovsky, G.A. Navratil, T.S. Pedersen, M. Shilov and N. Stillits, *Nuc. Fusion*, **45** (2005) 285.

“Magnetic field perturbations in closed-field-line systems with zero toroidal magnetic field,” D. Ryutov, J. Kesner, M. Mauel, *Phys. Plasmas* **11**, (2004) 2318.

“Dynamical plasma response of resistive wall modes to changing external magnetic perturbations,” M. Shilov, C. Cates, R. James, A. Klein, O. Katsuro-Hopkins, Y. Liu, M. Mauel, D. Maurer, G. A. Navratil, T. Pedersen, and N. Stillits, *Phys. Plasmas* **11**, (2004) 2573.

“Helium Catalyzed D-D Fusion in a Levitated Dipole,” J. Kesner, D. Garnier, A. Hansen, M. Mauel, L. Bromberg, *Nuc. Fusion* **44**, 193 (2004).

“High-speed optical diagnostic that uses interference filters to measure Doppler shifts,” S. Paul, C. Cates, M. Mauel, D. Maurer, G. A. Navratil, R. Paul, T. Pedersen, and M. Shilov, *Rev. Sci. Instr.* **75** (2004) 4077.

“Observation of nonlinear frequency-sweeping suppression with RF diffusion,” D. Maslovsky, B. Levitt, M. E. Mauel, *Phys. Rev. Lett.* **90**, 185001-1 (2003).

“Suppression of nonlinear frequency sweeping of resonant interchange modes in a magnetic dipole with applied radio frequency fields,” D. Maslovsky, B. Levitt, M. E. Mauel, *Phys. Plasmas* **10**, 1549-1555 (2003).

“Measurement of the Global Structure of Interchange Modes Driven by Energetic Electrons Trapped in a Magnetic Dipole,” B. Levitt, D. Maslovsky, M. E. Mauel, *Phys. Plasmas*, **9**, 2507-2517 (2002).

“Advanced technology paths to global climate stability: Energy for a greenhouse planet,” Hoffert, MI, Caldeira, K, Benford, G, Criswell, DR, Green, C, Herzog, H, Jain, AK, Kheshgi, HS, Lackner, KS, Lewis, JS, Lightfoot, HD, Manheimer, W, Mankins, JC, Mauel, ME, Perkins, LJ, Schlesinger, ME, Volk, T, Wigley, TML, *Science*, pp. 981-987, **298** (2002)

“Numerical Simulation of Phase-Space Flows in the Collisionless Terrella Experiment,” D. Maslovsky, M. Mauel, B. Levitt, *IEEE Trans. Plasma Science* **30** pp. 8-9 (2002).

“Effect of Magnetic Islands on the Local Plasma Behavior in the HBT-EP Tokamak,” E. D. Taylor, C. Cates, M. E. Mauel, D. A. Maurer, D. Nadle, G. A. Navratil, M. Shilov, *Phys. Plasmas* **9**, 3938 (2002).

“Status of the floating coil of the levitated dipole experiment,” Zhukovsky, A, Garnier, D, Gung, C, Kesner, J, Mauel, M, Michael, P, Minervini, J, Morgan, M, Pedersen, TS, Radovinsky, A, Schultz, J, *IEEE Transactions On Applied Superconductivity*, p. 666-669 **4** (2002).

“Design, fabrication and test of the react and wind, Nb<sub>3</sub>Sn, LDX floating coil,” Smith, B.A.; Schultz, J.H.; Zhukovsky, A.; Radovinsky, A.; Gung, C.; Michael, P.C.; Minervini, J.V.; Kesner, J.; Garnier, D.; Mauel, M.; Naumovich, G.; Kocher, R., *IEEE Trans. Applied Superconductivity* **11**(2001) 2010.

“High temperature superconducting levitation coil for the Levitated Dipole Experiment (LDX),” Schultz, J.H.; Driscoll, G.; Garnier, D.; Kesner, J.; Mauel, M.; Minervini, J.V.; Smith, B.; Radovinsky, A.; Snitchler, G.; Zhukovsky, A., *IEEE Trans. Applied Superconductivity* **11** (2001) 2004.

“Modeling of active control of external magnetohydrodynamic instabilities,” J. Bialek, A. Boozer, M. E. Mauel, G. A. Navratil, *Phys. Plasmas* **8** (2001) 2170.

“Real-time measurement of toroidal rotation,” Paul, S.F., Cates, C., Mauel, M., Maurer, D., Navratil, G., Shilov, M., *Review of Scientific Instruments* **72** (2001) 966.

“Dipole Equilibrium And Stability,” Kesner, J. and Simakov, A.N. and Garnier, D.T. and Catto, P.J. and Hastie, R.J. and Krasheninnikov, S.I. and Mauel, M.E. and Sunn Pedersen, T. and Ramos, J.J., *Nuclear Fusion*, **41** (2001) pp. 301-8.

“Suppression of resistive wall instabilities with distributed, independently controlled, active feedback coils,” C. Cates, M. Shilov, M. E. Mauel, G. A. Navratil, D. Maurer, D. Nadle, S. Mukherjee, J. Bialek, A. Boozer, *Phys. Plasmas* **7** (2000) 3133.

“The feedback phase instability in the HBT-EP tokamak,” D.L. Nadle, C. Cates, H. Dahi, M.E. Mauel, D. Maurer, S. Mukherjee, G.A. Navratil, M. Shilov, E.D. Taylor, *Nuclear Fusion* **40** (2000) 1714.

“Active Feedback Control Of The Wall Stabilized External Kink Mode,” G. A. Navratil, J. Bialek, A. Boozer, C. Cates, H. Dahi, M. E. Mauel, D. Maurer, S. Mukherjee, M. Shilov, Plasma Physics and Controlled Fusion Research 2000 (IAEA, 2000).

“Review of the fusion materials research program,” Harkness, S.D.; Baker, C.C.; Abdou, M.A.; Davis, J.W.; Hogan, W.; Kulcinski, G.L.; Mauel, M.; McHargue, C.; Odette, R.; Petti, D.A.; Shewmon, P.; Zweben, S.J., *J. Fusion Energy* **19** (2000) 45.

“Nonstationary signal analysis of magnetic islands in plasmas,” E. D. Taylor, C. Cates, M. E. Mauel, D. A. Maurer, D. Nadle, G. A. Navratil, M. Shilov, *Rev. Sci. Instr.* **70**, (1999).

“MHD Stability in a Levitated Dipole,” D. Garnier, J. Kesner, M. Mauel, *Phys. Plasmas* **6** (1999) 3431.

“The Levitated Dipole Experiment (LDX) magnet system,” Schultz, J.H. and Kesner, J. and Minervini, J.V. and Radovinsky, A. and Pourrahimi, S. and Smith, B. and Thomas, P. and Wang, P.W. and Zhukovsky, A. and Myatt, R.L. and Kochan, S. and Mauel, M. and Garnier, D., *IEEE Transactions on Applied Superconductivity* **9** (1999) 378.

“Stabilization of Kink Instabilities by Eddy Currents in a Segmented Wall and Comparison with Ideal MHD Theory,” A. M. Garofalo, E. Eisner, T. H. Ivers, R. Kombargi, M. E. Mauel, D. Maurer, D. Nadle, G. A. Navratil, M. K. Vijaya Sankar, E. Taylor and Q. Xiao, *Nuclear Fusion*, **38**, (1998), pp.1029-42.

“Active control of 2/1 magnetic islands in a tokamak”, G. A. Navratil, C. Cates, M. E. Mauel, D. Maurer, D. Nadle, E. Taylor, and Q. Xiao, W. A. Reass and G. A. Wurden, *Physics of Plasmas*, **5**, (1998), pp.1855-63.

“Deuterium-tritium plasmas in novel regimes in the Tokamak Fusion Test Reactor,” M. Bell, et al., *Phys. Plasmas*, **4**, p. 1714-24 (1997).

- “Review of D-T results from TFTR”, R. Hawryluk, et al., *Fusion Technology*, **30**, p. 648-59 (1997).
- “Laboratory observations of wave-induced radial transport within an "artificial radiation belt", M. Mauel, *Journal de Physique IV (Colloque)*, **7**, no.C4, p. 307-18, (1997).
- “Observation of Wall Stabilization and Active Control of low-n Magnetohydrodynamic Instabilities in a Tokamak,” T. H. Ivers, E. Eisner, A. Garofalo, M. E. Mauel, D. Maurer, D. Nadle, G. A. Navratil, M. K. V. Sankar, M. Su, E. Taylor, Q. Xiao, R. R. Bartsh, W. A. Reass, and G. A. Wurden, *Phys. Plasmas* **3** (1996) 1926.
- “Observation of wave-induced chaotic radial transport in a laboratory terrella experiment,” H. P. Warren, M. E. Mauel, D. Brennan, and S. Taromina, *Phys. Plasmas* **3** (1996) 2143.
- “Rotational and magnetic shear stabilization of magnetohydrodynamic modes and turbulence in DIII-D high-performance discharges,” L. L. Lao, K. H. Burrell, T. S. Casper, V. S. Chan, *et al*, *Phys. Plasmas* **3** (1996) 1951.
- “Demonstration of high-performance negative central magnetic shear discharges in the DIII-D tokamak,” B. W. Rice, K. H. Burrell, L. L. Lao, *Phys. of Plasmas* **3** (1996) 1983.
- “Observations of enhanced core confinement in negative magnetic shear discharges with an L mode edge on DIII-D,” Rice, B.W.; Lazarus, E.A.; *et al.*, *Nuc. Fusion* **36** (1996) 1271.
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## Selected Invited Presentations

“Exploring Plasma Dynamics with Laboratory Magnetospheres”, University of Michigan, Michigan Institute of Plasma Science and Engineering (MIPSE), Ann Arbor, MI. (Feb 2014)

“Exploring Plasma Dynamics with Laboratory Magnetospheres”, Culham Science Centre, Abingdon, Oxford, UK (Feb 2014)

“Fusion Turbulence without a Toroidal Field”, Session *Mixing in Fusion Plasma*, 55th Annual Meeting of the APS Division of Plasma Physics, Denver, CO. (Nov 2013)

“Turbulent Pinch, Laboratory Magnetospheres, and the Economic Viability of Fusion”, Princeton Plasma Physics Laboratory, Princeton University, (May 2013)

“Controlled Space Physics Experiments using Laboratory Magnetospheres”, DTRA Workshop on Physics, Modeling and Simulation of Nuclear Detonation (JOWOG 43), Washington, D.C. (June 2013)

“Powering the Future: What will fuel the next thousand years?” CBS News Interview, (Aug 2013)  
<http://www.cbsnews.com/news/powering-the-future-what-will-fuel-the-next-thousand-years/>

“Inward Turbulent Diffusion of Plasma in a Levitated Dipole,” presented at University of Wisconsin, University of New Hampshire, Princeton Plasma Physics Laboratory, 2009-2010

“Introduction to Magnetic Fusion Research,” presented to National Fusion Science Undergraduate Fellows, Princeton, 2009, 2010.

“Levitated Magnet Brings Physics of Space to the Laboratory,” 50<sup>th</sup> Anniversary Meeting of the APS0-DPP, Dallas, 2008

“Improved Confinement During Magnetic Levitation in LDX,” Independent Activities Lecture, MIT, 2009

“Clean Energy: Crossing the Divide,” CERA Executive Conference; East Meets West: New Frontiers of Energy Security, Istanbul, Turkey 2007

“Fusion Energy; Progress towards an Unlimited Energy Source,” U.S. Department of State, Washington, DC, 2007.

“The Levitated Dipole Experiment for Plasma Confinement,” XII Seminario Enzo Levi, Sociedad Mexicana de Fisica, 2005

“Fusion Energy in a Non CO2 Emitting Energy Portfolio,” AAAS Annual Meeting, Washington, DC, 2005

“Experiments with a Supported Dipole,” Innovative Confinement Concepts Workshop, Seattle, WA, 2004

“The Dipole Fusion Concept” and “Interchange Bubbles,” at the IPP, Griefswald, Germany, 2002.

“The Search for Optimum Confinement Configurations for Fusion Applications,” at the APS Centennial Meeting, Atlanta, GA, 1999.

“Achieving High Fusion Reactivity in High Poloidal Beta Discharges in TFTR” at the 14th International Conference on Plasma Physics and Controlled Nuclear Fusion, Würzburg, Germany, October, 1992.

## Serial Journal Abstracts, and Research Reports:

Over 350 Serial Journal Abstracts, and Research Reports.

## Thesis Supervision:

- 2 Undergraduate Thesis Projects (MIT)
- 25 Ph.D. Students Graduated (Columbia)
- 5 Ph.D. Students presently under supervision or co-supervision (Columbia)

## Postdoctoral Supervision:

B. Grierson, D. Garner, A. Hansen, T. Ivers, J. Levesque, D. Maurer, T. Pederson, V. Sankar, M. Shilov, H. Warren, M. Worstell

## Courses taught:

Courses include “Introduction to Digital Electronics”, “Electrodynamics”, “Introduction to Computational Physics and Mathematics”, “Applied Physics Laboratory”, “Introduction to Plasma Physics”, “Special Topics in Applied Mathematics”, “Introduction to FORTRAN”, “Programming Methods for Scientists and Engineers”, “Introduction to Nuclear Science”, “Physics of Plasmas”

## Short Biography

**MICHAEL MAUEL** was educated at MIT received his Sc.D. (1983) with a research specialty in plasma physics. Mauel joined the faculty of Columbia University in 1985 where he is currently Professor of Applied Physics. Mauel's research focus is high temperature magnetized plasma physics applied to fusion energy and to space weather. Dr. Mauel collaborated extensively with the TFTR research team at the Princeton Plasma Physics Laboratory where he participated in advanced tokamak experiments and in the world's first high-power D-T fusion experiments. He was a visiting scientist at DIII-D fusion experiment at General Atomics in 1994, where he controlled high-pressure “wall mode” instabilities and co-discovered techniques to generate internal transport barriers. At Columbia University, he built experimental programs in advanced control methods for tokamak fusion devices, in plasma processing in collaboration with IBM, and in laboratory space physics with the support of NASA, NSF, and the AFOSR. Mauel co-directs the Levitated Dipole Experiment, a joint research project of Columbia University and MIT that used high-field superconducting magnets to explore the application of magnetospheric physics to the confinement of high-pressure plasma in the laboratory and first demonstrated steady-state, high-pressure plasma confinement without a toroidal field. Professor Mauel served as Chair of the Department of Applied Physics and Applied Mathematics from 2000 to 2006. Mauel was named Teacher of the Year at Columbia's School of Engineering and Applied Science, received the Rose Prize for Excellence in Fusion Engineering, and was named a Jefferson Science Fellow by the National Academy of Sciences. Professor Mauel was awarded certificates of appreciation from the Secretary of Energy, for his work in fusion energy, and from the Assistant Secretary of State, for his work promoting sustainable development. Dr. Mauel is a fellow of the APS and served as Chair of the APS Division of Plasma Physics. He served as the Chair of the U.S. Burning Plasma Council, and now serves as Chair of the NRC Plasma Science Committee. He has also served as member and chair of numerous other physics and policy advisory committees addressing issues concerning fusion energy science, plasma physics research and education.