

Andrew P. Zwicker
Princeton Plasma Physics Laboratory
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EDUCATION:

Johns Hopkins University, Baltimore, MD
Ph.D. in Physics, 1992

Dissertation: "Soft X-Ray Spectroscopy of Magnetically Confined Fusion Plasmas Using Flat Multilayer Mirrors as Dispersive Elements"

Bard College, Annandale-on-Hudson, NY
B.A. in Physics, 1986

PROFESSIONAL EXPERIENCE

2003 – Present	Head, Science Education Department, Princeton Plasma Physics Laboratory
2000 – 2003	Lead Scientist, Science Education Department, Princeton Plasma Physics Laboratory
1998 – 2000	Senior Program Leader, Science Education Department, Princeton Plasma Physics Lab.
1993 – 1998	Postdoctoral Researcher, Oak Ridge National Laboratory

HONORS AND AWARDS

- Honorable Mention, The Flame Challenge, Center for Communicating Science, 2012
- Fellow of the American Physical Society, 2010
- Named one of 75 significant physics educators by the American Association of Physics Teachers, 2006
- First Prize, "Plasma Table," Princeton University Art of Science Competition, 2005
- U.S. Department of Energy, Office of Science, "Outstanding Undergraduate Mentor," 2003
- Sigma Xi, The Scientific Research Society, "Certificate of Recognition," 2003
- Henry A. Rowland Graduate Fellowship, Johns Hopkins University, 1987
- Walter J. Lewitt Scholar, Bard College, 1986

SERVICE TO PRINCETON UNIVERSITY

2013 - Present	Prospect House Advisory Board
2012 - Present	Organizer, Science Action student video competition
2007 - Present	Faculty Fellow, Rockefeller College
2003 – Present	Lecturer, Princeton Writing Program, " <i>The Ethics of Human Experimentation</i> "
2009 - Present	Organizer, Art of Science Competition
2010 - Present	Selection Committee, The Gregory T. Pope '80 Prize for Science Writing
2008, 2011	Reader, Martin A. Dale '53 Fellowship.

SERVICE TO THE COMMUNITY

2013 - Present	Editor, Physics and Society, the Newsletter of the APS Forum on Physics and Society
2011 - 2012	Education and Workforce Development Task Leader, Energy Efficient Buildings Hub
2011 - Present	President, Princeton Chapter, Sigma Xi, The Scientific Research Society
2011 - Present	Referee, European Physics Journal D, IEEE Transactions on Plasma Science
2010 - 2012	APS Committee on Education, Chair, Subcommittee on Undergraduate Education
2008 - 2009	Chair, Forum on Physics and Society, American Physical Society
2008 - Present	Merit Reviewer, National Science Foundation,
2008 – 2012	Advisory Council, School of Engineering, College of NJ
2006 – Present	Executive Committee, Princeton Chapter, Sigma Xi, The Scientific Research Society
2005 - 2009	Learning & Teaching Advisory Committee, Liberty Science Center
2004	Workforce Development Sub-Committee, Fusion Energy Advisory Committee, US Dept. of Energy
2001-2006	Secretary/Treasurer, Forum on Physics and Society, American Physical Society
1998-2001	Executive Committee, Forum on Education, American Physical Society
1997-Present	Committee on Science Education, Division of Plasma Physics, American Physical Society
2005 - 2009	Learning & Teaching Advisory Committee, Liberty Science Center

PROFESSIONAL AFFILIATIONS

American Physical Society (Fellow)
American Association for the Advancement of Science
American Association of Physics Teachers
Sigma Xi, The Scientific Research Society
Contemporary Physics Education Project
Coalition for Plasma Science

INVITED TALKS

Fusion Energy: Utopian or Practical? TEDx St. Peter's University, 2013

Creating a Star on Earth: The Challenge of Fusion Energy, Monmouth University, 2011

Creating a Star on Earth: The Challenge of Fusion Energy, St. Peter's College, 2009

Plasma Camp: Creating Stars in the Classroom Since 1998, Brookhaven National Laboratory 2006

K-16 Plasma Science Education at PPPL, University of Rochester, University of Scranton, 2006

Writing as a Concept Development Tool for Mathematics and Natural Sciences, NJ Writing Association Conference 2004

Recent Results from the Plasma Science Education Laboratory, Meeting of the Division of Plasma Physics, American Physical Society 2003

Interactive, inquiry-based nuclear fusion education via the Internet, National Conference of the American Chemical Society 2002

Creating a Star on Earth: The Status of Fusion Energy, Princeton University, 2003

Creating a Star on Earth: The Status of Fusion Energy, Davidson College, April, 2000

Creating a Star on Earth: The Status of Fusion Energy, Westinghouse Science Honors Institute, Pittsburgh, PA, 1999

Creating a Star on Earth: The Status of Fusion Energy, Gettysburg College, 1999

Creating a Star on Earth: The Status of Fusion Energy, Simon's Rock College of Bard, 1999

Creating a Star on Earth: The Status of Fusion Energy, Westinghouse Science Honors Institute, Pittsburgh, PA, 1998

Creating a Star on Earth: The Status of Fusion Energy, Thomas Jefferson National Accelerator Facility, Newport News, VA, 1998

Creating a Star on Earth: The Status of Fusion Energy, Washington and Jefferson College, Washington, PA, 1998

Creating a Star on Earth: The Status of Fusion Energy, Southampton College, Southampton, NY, 1998

Creating a Star on Earth: The Status of Fusion Energy, Westinghouse Science Honors Institute, Pittsburgh, PA, 1997

Using the Internet for Plasma Physics Education, 39th Annual Meeting of the Division of Plasma Physics, American Physical Society, 1997

Fusion as a Viable Alternative Energy Source, University of Chaing Mai, Chaing Mai, Thailand, 1995

TV AND OTHER APPEARANCES

"Science Education - Some Random Musings on My Adventures in Microgravity, Plasma Physics, and Science Education," (<http://science-edumacation.blogspot.com>)

"The Art of Science and The Search for an Absolute," NJ TV, March 14, 2013 (<http://watch.njtvonline.org/video/2344823731/>)

"New Exhibit Looks at Science Through an Artistic Lens," NJ Today, January 18, 2013 (<http://www.njtvonline.org/njtoday/video/new-exhibit-looks-at-science-through-an-artistic-lens/>)

"For PPPL scientist Andrew Zwicker, science has aesthetic value," The Daily Princetonian, May 7, 2013 (<http://www.dailyprincetonian.com/2013/05/07/33479/>)

"PPPL Answers a Burning Question," The Flame Challenge (<http://www.youtube.com/watch?v=pLvY1NXuh8>)

"No Paint Needed: This Art Is Created in the Laboratory," US 1 Newspaper, February 1, 2012 (http://www.princetoninfo.com/index.php?option=com_us1more&Itemid=6&key=02-01-2012Art)

"Making Ice Cream with Liquid Nitrogen," Let's Talk - Live, September 13, 2010 (<http://www.tbd.com/blogs/lets-talk-live/2010/09/making-ice-cream-with-liquid-nitrogen-1678.html>)

Physics Central, People in Physics (<http://www.physicscentral.com/explore/people/post.cfm>)

PEER REVIEWED PUBLICATIONS

S. Wissell, J. Ross, S. Gershman, and A. Zwicker, **The Use of DC Glow Discharges as Undergraduate Educational Tools**, American Journal of Physics, Vol.81, Issue 9 (2013)

Mike Hvasta and Andrew Zwicker, **Ultraviolet Induced Motion of a Fluorescent Dust Cloud in an Argon Direct Current Glow Discharge Plasma**, Journal of Undergraduate Research, Vol. VIII (2008) 74.

Edward Thomas, George Morales. Michael Brown, Troy Carter, Donald Correll, Kenneth Gentle, Andrew Zwicker, Ken Schultz, Earl Scime, Don Steiner, **Fusion in the Era of Burning Plasma Studies: Workforce Planning for 2004 to 2014**, Journal of Fusion Energy, Vol. 22, No. 2, June 2004.

R. Majeski, R. Kaita, M. Boaz, P. Efthimion, T. Gray, B. Jones, D. Hoffman, H. Kugel, J. Menard, T. Munsat, A. Zwicker, V. Soukhanovskii, J. Spaleta, G. Taylor, J. Timberlake, R. Woolley, L. Zakharov, M. Finkenthal, D. Stutman, G. Antar, R. Doerner, S. Luckhardt, R. Seraydarian, R. Maingi, M. Maiorano, S. Smith, and D. Rodgers, **Testing of Liquid Lithium Limiters in CDX-U**, Fusion Engineering and Design **72** (2004) 121–132

R. Kaita a, R. Majeski M. Boaz, P. Efthimion B. Jones D. Hoffman, H. Kugel J. Menard T. Munsat A. Post-Zwicker V. Soukhanovskii J. Spaleta G. Taylor J. Timberlake R. Woolley L. Zakharov, M. Finkenthal D. Stutman G. Antar , R. Doerner , S. Luckhardt , R. Maingi d M. Maiorano S. Smith, **Spherical torus plasma interactions with large-area liquid lithium surfaces in CDX-U**, Fusion Engineering and Design 6162 (2002) 217222

Andrew Post-Zwicker, **Fusion information on the web**, Am. J. Phys. **68**, 788 (2000)

A.P. Post-Zwicker, J. Baron, W. Davis, M. McKay, R. Pfaff, and D.P. Stotler, **An Interactive Model for Teaching Contemporary Physics Topics via the World Wide Web Using Real-Time Data**, Journal of Science Education and Technology, **8**(4), 273 (1999).

N.R. Guilbert and A.P. Post-Zwicker, **'Plasma Camp': A Different Approach to Professional Development for Physics Teachers**, Journal of the National Consortium of Specialized Secondary Schools of Mathematics, Science, and Technology, **4**(2) 11 (1999).

F. Paoletti, A. Cardinali, S. Bernabei, A. Post-Zwicker, W. Tighe, S. Von Geoler, **Experimental and Theoretical Investigation of Synergy Between Ion Bernstein and Lower Hybrid Waves in PBX-M**, Physics of Plasmas, **6**(3), 863 (1999)

S. Sesnic, et al. (including A. Post-Zwicker), **Magnetohydrodynamic Behaviour During Core Transport Barrier Experiments With Ion Bernstein Wave Heating In PBX-M: I Elms, Fluctuations And Crash Events**, Nuclear Fusion, **38**(6), 835 (1998).

S. Sesnic, et al. (including A. Post-Zwicker), **Magnetohydrodynamic Behaviour During Core Transport Barrier Experiments With Ion Bernstein Wave Heating In PBX-M: II $n=m-1$ And $n=m$ Modes**, Nuclear Fusion, **38**(6), 861 (1998).

A.M. Messiaen et al. (including A. Post-Zwicker), **High Confinement and High Density with Stationary Plasma Energy and Strong Edge Radiation Cooling in the Upgraded Torus Experiment for Technology Oriented Research (TEXTOR-94)**, Physics of Plasmas, **4**(5), 1690 (1997).

M.A. Pedrosa, I. Garcia-Cortes, B. Branas, R. Balbin, C. Hidalgo, L. Schmitz, G. Tynan, A. Post-Zwicker, PBX-M Team, **On the Influence of Atomic Physics Mechanisms on Edge Plasma Turbulence in the TJ-I and Princeton Beta Experiment-Modified Tokamaks**, *Physics of Plasmas*, **2**(7), 2618 (1995).

A.P. Zwicker, R.C. Isler, W. Tighe, S. Paul, M. Ono, B. LeBlanc, R. Bell, H. Kugel, **Impurity Behavior During Ion Bernstein Wave Heating in the PBX-M Tokamak**, *Nuclear Fusion*, **35**(2), 215 (1995).

A.P. Zwicker, M. Finkenthal, H.W. Moos, **Analysis of Impurity Content and Transport in Tokamak Plasmas Using Low Resolution XUV Spectra**, *Journal of X-Ray Science and Technology*, **4**, 57 (1993).

M. Finkenthal, S. Lippmann, L.K. Huang, A. Zwicker, H.W. Moos, W.H. Goldstein, A.L. Osterheld, **O-Shell Emission of Heavy Atoms in an Optically Thin Tokamak Plasma**, *Phys. Rev. A.*, **45**, 5846 (1992) .

D. Stutman, S. Kovnovich, M. Finkenthal, A.P. Zwicker, H.W. Moos, **Photometric Calibration of Soft X-Ray and P-Terphenyl Coated Photodiodes in the 180 - 1500 eV Range for Fusion Plasma Spectroscopy**, *Rev. Sci. Instrum.*, **62**(11), 2719 (1991).

A.P. Zwicker, S.P. Regan, M. Finkenthal, H.W. Moos, E.B. Saloman, R. Watts, J.R. Roberts, **Peak Reflectivity Measurements of W/C, Mo/Si, and Mo/B₄C Multilayer Mirrors in the 8 - 190 Å Range Using Both K α Line and Synchrotron Radiation**, *Applied Optics*, **29**, No. 25, 3694 (1990).

M. Finkenthal, A.P. Zwicker, S.P. Regan, H.W. Moos, D. Stutman, **Near Normal Incidence Spectroscopy of a Penning Ionization Discharge in the 100 - 180 Å Range with Flat Multilayer Mirrors**, *Applied Optics*, **29**, No. 24, 3467 (1990).

Xiao, F. Streitz, A. Gavrin, M. Cieplak, J. Childress, M. Lu, A. Zwicker, C.L. Chien, **Flux Pinning and Critical Current Density in YBa₂Cu₃O_{6+y} and Eu₂BaCu₃O_{6+y} Superconductors**, *Phys. Rev. B*, **36**(4), 2382 (1987).

CONFERENCE PROCEEDINGS AND OTHER PUBLICATIONS

Andrew Zwicker, Aliya Merali, Stephanie Wissel, John DeLooper, **Novel Methods for Communicating Plasma Science to the General Public**, *Bulletin of the American Physical Society*, (2012).

Andrew Zwicker, John DeLooper, Deedee Ortiz, Aliya Merali, Stephanie Wissel, **The PPPL Education Pipeline, Where Does it Lead?**, *Bulletin of the American Physical Society*, (2011).

Stephanie A. Wissel, J. T. Morgan, J. Fierroz, J. L. Ross, A. Zwicker, **Longitudinal Study of the Impact of Attending the NUF/SULI Program on Undergraduates' Careers**, *Bulletin of the American Physical Society*, (2010).

S. A. Wissel, J. L. Ross, J. T. Morgan, A. Zwicker, **Using Plasmas to Encourage Leadership Roles in Undergraduate Research**, *Gordon Research Conference on Physics Research & Education* (2010).

Andrew Zwicker, John DeLooper, James Morgan, Jerry Ross, Stephanie Wissel, **The Creation of a PPPL-NASA Collaboration for Science Education**, *Bulletin of the American Physical Society*, (2010).

Andrew Zwicker, James Morgan, and John DeLooper, **On the Role of an Authentic Research Experience for K-12 Science Teachers**, *Bulletin of the American Physical Society*, (2009).

Andrew P. Zwicker, Jose Lopez, James Clayton, **Practical Application of Research in Science Education (PARSE) – A New Collaboration for K-12 Science Teacher Professional Development**, *Bulletin of the American Physical Society*, (2008).

Andrew Zwicker, John DeLooper , Andy Carpe , Joe Amara , Nancy Butnick , Ellen Lynch , Jeff Osowski, **Plasma Physics/Fusion Energy Education at the Liberty Science Center**, Bulletin of the American Physical Society, (2007).

Zwicker, Andrew P.; Morgan, J.; Ritter, C.; DeLooper, J.; Guilbert, N., **Teaching about 21st Century Energy Sources to Pre-college Students and Teachers**, AAS/AAPT Joint Meeting, American Astronomical Society Meeting, Bulletin of the American Astronomical Society, Vol. 38, p.1221, (2007)

Andrew P. Zwicker, Enrique Mernino, **Formation, Transport, and effects of UV light on a Fluorescent Dust Cloud**, 11th Workshop on the Physics of Dusty Plasmas, Williamsburg, VA, (2006).

Andrew Zwicker, Christine Ritter, James Morgan, Chris DeJesus, Nick Guilbert, **The PPPL-Trenton Partnership: Past, Present, Future**, Bulletin of the American Physical Society, (2004).

Andrew Zwicker, Russell Hulse, and Sophia Gershman, **A Plasma Science Education Laboratory for K-16 Teachers and Students**, Bulletin of the American Physical Society, (2002).

Sophia Gershman and Andrew Post-Zwicker, **The Use of a Glow Discharge to Teach Introductory Physics**, Bulletin of the American Physical Society, (2001).

Andrew Post-Zwicker, **I Dare You to Try It**, NextWave, the online journal of Science, 3/31/00. (<http://nextwave.sciencemag.org/cgi/content/full/2000/03/31/2>)

R. Majeski, R. Kaita, H. Kugel, R. Doerner, P. Efthimion, M. Finkenthal, M. Iovea, B. Jones, S. Luckhardt, R. Maingi, T. Munsat, A. Post-Zwicker, V. Soukhanovskii, D. Stutman, and G. Taylor, **Liquid Lithium Limiter Experiments in CDX-U**, 14th International Conference on Plasma Surface Interaction in Controlled Fusion Devices, Rosenheim, Germany May 22-26, 2000.

Andrew P. Post-Zwicker and Nicholas R. Guilbert, **On the Efficacy of a Research-Based Experience for Introducing Plasmas into the High School Physics Classroom**, Bulletin of the American Physical Society, Seattle, WA, (1999).

A.P. Post-Zwicker and N.R. Guilbert, **A New Model for Bringing Contemporary Physics Topics into the High School Classroom**, Newsletter of the Forum on Education, American Physical Society, Fall, 1998.

A.P. Post-Zwicker, D. Barnes, D. Carroll, W. Davis, R. Pfaff, D. Stotler, M. Williams, J. Baron, M. McKay, E. Friedman, **Using the Internet for Plasma Physics Education**, Proceedings of the 17th IEEE Symposium on Fusion Engineering, Vol. 2, pp. 760-764 (1997)

G.H. Wolf et al. (Including A. Post-Zwicker), **Quasi-stationary ELM-free High Confinement with Edge Radiation Cooling in TEXTOR-94**, in Plasma Physics and Controlled Nuclear Fusion Research, 1996, Montreal, paper IAEA-CN-64/02-5 (International Atomic Energy Agency, Vienna).

C.M. Barshick, R.W. Shaw, A.P. Post-Zwicker, J.P. Young, J.M. Ramsey, **Diode Laser Excited Optogalvanic Spectroscopy of Glow Discharges**, 8th International Symposium on Resonance Ionization Spectroscopy and its Applications, State College, PA (1996).

A.P. Post-Zwicker, D.L. Hillis, H. Euringer, K.H. Finken, G. Mank, **Helium Exhaust Studies in the TEXTOR-94 Tokamak**, Proceedings of the 22nd European Physical Society's Division of Plasma Physics, 1, 61 (1995).

A.P. Zwicker, M. Finkenthal, S. Lippmann, H.W. Moos, **Carbon Transport in a Tokamak Plasma using Soft X-Ray CVI Emission**, in *UV and X-Ray Spectroscopy of Astrophysical and Laboratory Plasmas*, ed. by E.H. Silver and S.M. Kahn, Cambridge University Press, 1993, pp. 607-610.

S. von Goeler, S. Bernabei, W. Davis, D. Ignat, S. Jones, R. Kaita, G. Petravich, F. Rimini, P. Roney, J. Stevens, A. Post Zwicker, **Determination of the Energy of Suprathermal Electrons during Lower Hybrid Current Drive on PBX-M**, Proceedings of the 14th Topical A.P.S. Conference on RF Plasma Heating, Boston, (1993).

W. Tighe, R. Bell, T.K. Chu, H. Hermann, B. LeBlanc, M. Ono, A. Post Zwicker, et al., **Changes to the Ion Temperature Profile during Ion Bernstein Wave Heating in PBX-M**, Proceedings of the 14th Topical A.P.S. Conference on RF Plasma Heating, Boston, (1993).

B. LeBlanc, M. Ono, W. Tighe, J. Dunlap, R. Bell, T.K. Chu, A. England, R. Isler, S. Kaye, D. McClune, M. Okabayashi, A. Post Zwicker, H. Takahashi, S. Sesnic, **Density Profile Modification During IBW in PBX-M**, Proceedings of the 14th Topical A.P.S. Conference on RF Plasma Heating, Boston, (1993).

S. Bernabei, et al. (including A. Post-Zwicker), **Effect of MHD Modes of Fast Electrons Generated by Lower Hybrid Current Drive**, Proceedings of the 14th Topical A.P.S. Conference on RF Plasma Heating, Boston, (1993).

H. Takahashi, et al. (including A. Post-Zwicker), **Accessibility for Lower Hybrid Waves in PBX-M**, Proceedings of the European Physical Society, Lisbon, Portugal, (1993).

H. Kugel, Y. Hirooka, J. Timberlake, R. Bell, A. England, R. Isler, S. Jones, R. Kaita, S. Kaye, M. Okabayashi, S. Paul, A. Post Zwicker, H. Takahashi, W. Tighe, S. von Goeler, **Initial Boronization of PBX-M Using Ablation of Solid Boronized Probes**, PPPL Report # 2903 (1993).

A.P. Zwicker, M. Finkenthal, L.K. Huang, S.P. Regan, M.J. May, H.W. Moos, **A Multilayer Mirror Based Soft X-Ray Scanning Monochromator for Magnetically Confined Fusion Plasmas**, *Rev. Sci. Instrum.*, **63**, 5035 (1992).

A.P. Zwicker, M. Finkenthal, L.K. Huang, H.W. Moos, **Soft X-Ray Spectra of the DIII-D Plasma Measured with a Multilayer Mirror Monochromator**, *Bulletin of the American Physical Society*, **36**, No. 9, 2493 (1991).

A.P. Zwicker, S.P. Regan, M. Finkenthal, H.W. Moos, **High Throughput Multilayer Mirror Based Soft X-Ray Spectrometer for Metallic Impurity Emission from Tokamaks**, *Rev. Sci. Instrum.*, **61**(10), 2786 (1990).

W. Moos, A.P. Zwicker, S.P. Regan, M. Finkenthal, **Layered Synthetic Microstructures for Soft X-Ray Spectroscopy of Magnetically Confined Plasmas**, *Rev. Sci. Instrum.*, **61**(10), 2733 (1990).

S.P. Regan, A.P. Zwicker, M. Finkenthal, H.W. Moos, T.W. Barbee, Jr., **Evaluation of a Multilayer Mirror Spectrometer in the 230 -304 Å Wavelength Range**, *Rev. Sci. Instrum.*, **61**(10), 2789 (1990).

A.P. Zwicker, S.P. Regan, M. Finkenthal, H.W. Moos, **Radiative Power Loss Measurements from Tokamaks Using a Simple Multilayer Mirror Based Spectrometer**, *Bulletin of the American Physical Society*, **35**, No. 9, 2042 (1990).

M. Finkenthal, A.P. Zwicker, H.W. Moos, **Novel Soft X-Ray Diagnostics for Magnetically Confined Fusion Plasmas Using Layered Synthetic Microstructures (LSM) Coated Flat Surfaces and Gratings**, *Proc. Soc. Photo-opt. Instrum. Eng.*, **1140**, (1989).

A.P. Zwicker, S.P. Regan, M. Finkenthal, H.W. Moos, J.R. Roberts, E.B. Saloman, **An Evaluation of Multilayer Mirrors for Fusion Plasma Diagnostics**, *Bulletin of the American Physical Society*, **34**, No. 9, 2107 (1989).