

JESSICA ANN BAUMGAERTEL

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EDUCATION

Ph.D.-Astrophysical Sciences, Princeton University, Program in Plasma Physics **Anticipated: May 2012**
Dissertation: *Study of the Effects of Stellarator Geometry on Gyrokinetic Drift-wave Turbulence*
Advisors: Prof. Greg Hammett and Dr. David Mikkelsen

M.A.-Astrophysical Sciences, Princeton University, Program in Plasma Physics **January 2009**

B.S.-Physics, University of Washington **March 2006**

B.S.-Mathematics, University of Washington **March 2006**

A.A.S., Olympic College **June 2002**

RESEARCH EXPERIENCE

Research Assistant, Princeton University, Program in Plasma Physics **2008-present**
Advisors: Prof. G. W. Hammett and Dr. D. R. Mikkelsen

Research topic: Investigated plasma drift wave stability in stellarators (a type of fusion energy device). Upgraded a gyrokinetic turbulence code written in FORTRAN 90 and wrote a new computational grid generator in MATLAB in order to apply standard methods to more complicated experimental design. Systematically studied the effect of several plasma parameters on linear instabilities in current and under-construction machines. Collaborated with German and Japanese colleagues, remotely and via a three-week stay in Germany. Published results. Developed independent thinking, quantitative, computational, and presentation skills.

Summer Research Fellow, University of Maryland **Summer 2008**
Dept. of Energy Fusion Energy Sciences Fellowship Practicum
Advisor: Prof. W. Dorland

Research topic: Studied gyrokinetics, a mathematical description of plasma turbulence, and general 3D geometry. Learned to use FORTRAN 77 and 90 codes that build geometry input files for a gyrokinetic turbulence code. Presented at a national conference. Built computational and quantitative skills.

Research Assistant, Princeton University, Program in Plasma Physics **2007-2008**
Advisor: Prof. S. Jardin

Research topic: Studied the stability of a reduced set of the magnetohydrodynamic (MHD) equations, which provide a fluid description of plasmas in toroidal geometry. Developed quantitative skills.

Science and Engineering Fellow, Princeton University, Program in Plasma Physics **2006-2007**
Advisor: Dr. H. Ji

Research topic: Characterized electromagnetic fluctuations in the Magnetic Reconnection Experiment (MRX), using a magnetic dipole antenna to launch perturbations. Experiments and analysis investigated the cause and propagation characteristics of an observed signal which grew in time. Worked closely with other students. Presented at a national conference. Developed collaborative and analytical skills.

Scientific Analyst Intern, ScienceOps, Bothell, WA **2006**
Supervisor: Dr. T. Frajka

Research topic: Co-developed and documented software to analyze internet marketing data using cluster analysis and other statistical methods with Mathematica. Conducted preliminary research for the 3-D simulation of an electrostatic antenna. Gained experience in a non-academic lab environment as well as computational and analytical skills.

Undergraduate Summer Research Intern, Princeton Plasma Physics Laboratory **Summer 2005**
Dept. of Energy's Science Undergraduate Laboratory Internship
Advisor: Dr. M. H. Redi

Research topic: Studied microturbulence and drift wave stability in the National Spherical Torus Experiment (NSTX) by computational methods. Compared microtearing stability in NSTX with proposed plasmas in the International Thermonuclear Experimental Reactor (ITER). Used a gyrokinetic simulation code, GS2, and wrote

Perl scripts to facilitate the creation of input and analysis of output. Wrote a Dept. of Energy internal lab report and presented at a national conference. Developed computational and communication skills.

Student Research Assistant, Dept. of Aeronautics and Astronautics, University of Washington **Fall 2004**
Advisor: Dr. R. J. Smith

Research topic: Worked on the Steady Inductive Helicity Injected Torus (HIT-SI) experiment in the Plasma Dynamics Group. Diagnosed the internal magnetic structure of the plasma using an internal magnetic probe array and developed MATLAB routines to analyze the data. Performed hands-on tasks around the machine as needed. Developed computational and analytical skills.

Undergraduate Summer Research Intern, Princeton Plasma Physics Laboratory **Summer 2004**
Dept. of Energy's Science Undergraduate Laboratory Internship
Advisor: Dr. M. H. Redi

Research topic: Studied microturbulence and the stability of drift waves in Alcator C-Mod by computational methods. Used a gyrokinetic simulation code, GS2, and extensive use of MS Excel. Published results in the Dept. of Energy's Journal of Undergraduate Research and presented at two national conferences. Developed computational and communication skills.

Undergraduate Summer Research Fellow, General Atomics (GA), La Jolla, CA **Summer 2003**
Dept. of Energy's OFES National Undergraduate Fellowship in Plasma Physics and Fusion Engineering
Advisor: Dr. R. I. Pinsker

Research topic: Investigated the solutions to differential equations governing the propagation of electromagnetic waves through plasmas. This was done by exact, analytic calculation, and approximate methods, using the Interactive Data Language (IDL). Developed computational and analytical skills.

TEACHING EXPERIENCE

Teaching Assistant, Dept. of Physics, University of Washington **2004-2006**
Assisted with recitation sections, tutored in the study center, and graded for algebra- and calculus-based freshman physics. Emphasized independent thought and self-motivation.

Grading Assistant, Dept. of Mathematics, University of Washington **2003-2004**
Graded homework for Linear Analysis and Advanced Multivariable Calculus II.

WORKSHOPS

U.S.-Japan Joint International Fusion Theory workshop, Long Branch, NJ **September 2011**

U.S. Transport Task Force workshop, Annapolis, MD **April 2010**

International Stellarator / Heliotron Workshop, Princeton, NJ **October 2009**

CMPD/CMSO Winter School: Instabilities in Plasmas, Los Angeles, CA **Winter 2008**

AWARDS

U.S. Delegate to the Lindau Meeting of Nobel Laureates and Graduate Students, Germany **2008**

U.S. Department of Energy Fusion Energy Sciences Fellowship **2007-2010**

Science and Engineering Fellowship, Princeton University **2006-2007**

Graduated Cum Laude, with Distinction in Physics, University of Washington **2006**

Annual Dean's List, University of Washington **2002-2005**

Dean's List Graduate, Olympic College **2002**

Annual Dean's List, Olympic College **2001-2002**

President's List, Olympic College **Winter 2002**

PUBLICATIONS

J. A. Baumgaertel, E. A. Belli, W. Dorland, W. Guttenfelder, G. W. Hammett, D. R. Mikkelsen, G. Rewoldt, W. M. Tang, and P. Xanthopoulos, *Simulating Gyrokinetic Microinstabilities in Stellarator Geometry with GS2* Physics of Plasmas **18**, 122301 (2011)

J. A. Baumgaertel, M. H. Redi, R. V. Budny, W. Dorland, G. Rewoldt, *Gyrokinetic Stability Studies of the Microtearing Mode in the National Spherical Torus Experiment H-mode*, Princeton Plasma Physics Laboratory Report #4119, 2005, pp. 24

M. H. Redi, W. Dorland, C. L. Fiore, J. A. Baumgaertel, E. M. Belli, T.S. Hahm, G. W. Hammett, G. Rewoldt, *Microturbulent drift mode stability before internal transport barrier formation in the Alcator C-Mod radio frequency heated H-mode* Physics of Plasmas 12, 7, 072519 (2005)

J. A. Baumgaertel, M. H. Redi, R. V. Budny, D. C. McCune, W. Dorland, C. L. Fiore, *Marginal Stability Studies of Microtubulence at Onset of ITB on Alcator C-Mod*, Department of Energy's Journal of Undergraduate Research 5, 2005, p. 56

CONFERENCE TALKS

Upgrades of GS2 for stellarators and initial gyrokinetic results, Fusion Theory Working Group Meeting, Wolfgang Pauli Institute, Vienna, Austria, April 2011

CONFERENCE POSTERS

J.A. Baumgaertel, W. Guttenfelder, G.W. Hammett, D.R. Mikkelsen, P. Xanthopoulos, J. Geiger, W. Dorland, E.A. Belli, *Linear gyrokinetic studies in NCSX and W7-X stellarators with the GS2 code*, American Physical Society, Division of Plasma Physics, Salt Lake City, UT. November 2011

J.A. Baumgaertel, W. Guttenfelder, G.W. Hammett, D.R. Mikkelsen, P. Xanthopoulos, J. Geiger, W. Dorland, E. A. Belli, *Improved algorithms for the GS2 code and application to gyrokinetic studies in the NCSX and W7-X Stellarators*, International Conference on Numerical Simulation of Plasmas, Long Branch, NJ. September 2011

J.A. Baumgaertel, W. Guttenfelder, G.W. Hammett, D.R. Mikkelsen, P. Xanthopoulos, H. Maassberg, J. Geiger, Y. Turkin, W. Dorland, E.A. Belli, *Linear gyrokinetic studies in W7-AS and W7-X stellarators with the GS2 code*, American Physical Society, Division of Plasma Physics, Chicago, IL. November 2010

J. A. Baumgaertel, G. W. Hammett, D. R. Mikkelsen, W. Dorland, H. Massberg, J. Geiger, P. Xanthopoulos, *Linear and nonlinear gyrokinetic studies of turbulence in stellarator geometry with the GS2 code*, 2010 International Sherwood Fusion Theory Conference, Seattle, WA. April 2010

J. A. Baumgaertel, G. W. Hammett, D. R. Mikkelsen, W. Dorland, H. Massberg, J. Geiger, P. Xanthopoulos, *Linear and nonlinear gyrokinetic studies of turbulence in stellarator geometry with the GS2 code*, U.S. Transport Task Force Workshop, Annapolis, MD. April 2010

J.A. Baumgaertel, G.W. Hammett, D.R. Mikkelsen, W. Dorland, E.A. Belli, *Linear and nonlinear gyrokinetic studies of turbulence in stellarator geometry with the GS2 code*, American Physical Society, Division of Plasma Physics, Atlanta, GA. November 2009

J.A. Baumgaertel, G.W. Hammett, D.R. Mikkelsen, W. Dorland, E.A. Belli, *Linear and nonlinear gyrokinetic studies of turbulence in stellarator geometry with the GS2 code*, International Stellarator / Heliotron Workshop, Princeton, NJ. October 2009

J.A. Baumgaertel, W. Dorland, E. A. Belli, D.R. Mikkelsen, G.W. Hammett, M.A. Barnes, *Investigation of gyrokinetic instabilities in stellarator geometry with the GS2 code*, American Physical Society, Division of Plasma Physics, Dallas, TX. November 2008

J. A. Baumgaertel, S. Dorfman, B. McGeehan, S. Gerhardt, H. Ji, M. Yamada, *Active Perturbations in the Outflow Region of the MRX Current Sheet*, American Physical Society, Division of Plasma Physics, Orlando, FL. November 2007

J. A. Baumgaertel, M. H. Redi, R. V. Budny, W. Dorland, G. Rewoldt, *Gyrokinetic Stability Studies of the Microtearing Mode in the National Spherical Torus Experiment H-mode*, American Physical Society, Division of Plasma Physics, Denver, CO. October 2005

J. A. Baumgaertel, M. H. Redi, R. V. Budny, D. C. McCune, W. Dorland, C. L. Fiore, *Marginal Stability Studies of Microtubulence at Onset of ITB on Alcator C-Mod*, American Association for the Advancement of Science, Annual Meeting, Washington D.C. February 2005

J. A. Baumgaertel, M. H. Redi, R. V. Budny, D. C. McCune, W. Dorland, C. L. Fiore, *Marginal Stability Studies of Microtubulence at Onset of ITB on Alcator C-Mod*, American Physical Society, Division of Plasma Physics, Savannah, GA. November 2004

COMPUTER SKILLS

Windows OS, Linux OS, Mac OS, Microsoft Office, LaTeX, MATLAB, Mathematica, IDL, Fortran, C, Perl, HTML, HPC, PBS, TERPSICHORE, VVBAL, GS2

LANGUAGE SKILLS

English (native), German (intermediate), Spanish (basic)

PROFESSIONAL SERVICE

Member , American Physical Society	2004-present
Delegate , Princeton Plasma Physics Laboratory, U.S. Congressional Fusion Lobby	2008 and 2011
Member , National Undergraduate Fellowship Selection Committee	2008-2011
Leader , One-day physics outreach sessions for several Kindergarten and first grade classes	2010
Moderator , NJ Middle School and High School Science Bowl	2007-2010
Volunteer , American Physical Society's Division of Plasma Physics Plasma Expo	2007-2010
Department Representative , Graduate Student Government, Princeton University	2008-2009
Member , Science Education Postdoc Search Committee	November 2009
Undergraduate Representative , University of Washington Physics Curriculum Committee	2005-2006
Website Administrator , University of Washington Society of Physics Students	2005-2006
Volunteer , University of Washington Mathday	2004 & 2005

OTHER ACTIVITIES

Organizer, Frosty 5K race, December 2009. Secretary and Instructor, Princeton Swing (Dance) Club, 2006-2007. Student Honors Recitalist, piano, Washington Music Teachers Association Annual Convention, June 2002. Piano scholarship recipient, Kitsap County Music Teachers Association, June 2002. Swimming instructor, Summer 2001. Piano teacher, 2001-2002.