Dennis P Boyle

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Education

Princeton University
Ph.D. Candidate in Astrophysical Sciences, Program in Plasma Physics — Anticipated 2016
Thesis: *Measurements of impurity concentrations and transport in the Lithium Tokamak Experiment*

M.A. in Astrophysical Sciences, Program in Plasma Physics — 2010

Columbia University School of Engineering and Applied Science
B.S. in Applied Physics, *magna cum laude* — 2008

Research Experience

Lithium Tokamak Experiment – Princeton Plasma Physics Laboratory — 2011 – Present
Advisor: R. Kaita
Experimental study of effects of lithium-coated walls on impurity transport in a tokamak using doppler, survey, and Thomson scattering spectroscopy. Installed, calibrated, and operated multiple visible and EUV spectrometers. Designed and implemented upgrade to visible collection optics. Re-aligned, re-calibrated, and improved Thomson scattering system. Adapted Visual Basic programs to automate all spectroscopic diagnostics and cameras. Wrote analysis software in IDL and Python. Transport analysis with TRANSP, NCLASS, and MIST. Operated and optimized tokamak and installed, maintained, and operated subsytems: vacuum, electrical, high pressure gas/liquid, cryogenic, lithium, diagnostics, data acquisition. Preliminary results show low to modest core impurity levels with solid and liquid lithium coatings.

National Spherical Torus Experiment – Princeton Plasma Physics Lab — 2010 – 2012
Advisor: R. Maingi
Investigation of the relationships between suppression of edge instabilities, evolution of edge plasma profiles, and lithium wall coatings using profile and edge stability analysis tools. Analyzed dataset with General Atomics pyTools, IDL, and MDSplus. Has yielded more complete understanding of mechanisms by which lithium suppresses instabilities.

Levitated Dipole Experiment – MIT Plasma Science and Fusion Center — 2009
Advisor: M.E. Mauel
Analysis of vacuum vessel eddy currents using a "Copper Plasma". Designed, constructed, and operated copper coils to simulate plasma and wrote magnetic analysis codes in IDL and Mathematica; resulted in improvement of magnetic diagnostics.

Lithium Tokamak Experiment – Princeton Plasma Physics Laboratory — 2008
Advisors: R. Kaita and R. Majeski
Assembly of tokamak and installation of magnetic and spectroscopic diagnostics.

Electrostatic Dust Detector – Princeton Plasma Physics Laboratory 2007
Advisor: C.H. Skinner
Optimization and characterization of electrostatic dust detectors for use in fusion devices.

Columbia Non-Neutral Torus – Columbia University 2005 – 2008
Advisor: T.S. Pedersen
Design, machining, construction, and calibration of circuitry, probes and related devices for plasma diagnostics. Transitioned circuit design and construction to printed circuit boards, used LabView for automated calibration.

Publications (first-author)

D.P. Boyle, J.M.Canik, R. Maingi, et al., *Varying the pre-discharge lithium wall coatings to alter the characteristics of the ELM-free H-mode pedestal in NSTX*, **Journal of Nuclear Materials** 438 (2013) S979–S982

D.P. Boyle, R. Maingi, P.B. Snyder, et al., *The relationships between edge localized modes suppression, pedestal profiles and lithium wall coatings in NSTX*, **Plasma Physics and Controlled Fusion** 53, (2011) 105011

D.P. Boyle, C.H. Skinner, and A.L. Roquemore, *Electrostatic dust detector for fusion devices with improved sensitivity*, **Journal of Nuclear Materials** 390–391 (2009) 1086–1089

Publications (co-author)

J.C. Schmitt, et al., *High performance discharges in the Lithium Tokamak eXperiment with liquid lithium walls*, **Physics of Plasmas** 22 (2015) 056112

M. Lucia, et al., *Dependence of LTX plasma performance on surface conditions as determined by in situ analysis of plasma facing components*, **Journal of Nuclear Materials** 463 (2015) 907

K. Tritz, et al., *VUV/XUV measurements of impurity emission in plasmas with liquid lithium surfaces on LTX*, **Plasma Physics and Controlled Fusion** 56 (2014) 125014

K. Widmann, et al., *High-resolution grazing-incidence spectrometer for temperature measurements of low-Z ions emitting in the 100-300 Å spectral band*, **Review of Scientific Instruments** 85 (2014) 11D630

R. Maingi, D.P. Boyle, J.M. Canik, S.M. Kaye, C.H. Skinner, et al., *The effect of progressively increasing lithium coatings on plasma discharge characteristics, transport, edge profiles, and ELM stability in NSTX*, **Nuclear Fusion** 52 (2012) 083001

T.K. Gray, T.M. Biewer, D.P. Boyle, et al., *Spectral emission measurements of lithium on the lithium tokamak experiment*, **Review of Scientific Instruments** 83 (2012) 10D537

R. Maingi, S.M. Kaye, C.H. Skinner, D.P. Boyle, J.M. Canik, et al., *Continuous Improvement of H-Mode Discharge Performance with Progressively Increasing Lithium Coatings in the National Spherical Torus Experiment*, **Physical Review Letters** 107 (2011) 145004

Publications (contributing author)

S.M. Kaye, et al., *An overview of recent physics results from NSTX*, **Nuclear Fusion** 55 (2015) 104002

R. Maingi, et al., *Dependence of recycling and edge profiles on lithium evaporation in high triangularity, high performance NSTX H-mode discharges*, **Journal of Nuclear Materials** 463 (2015) 1134

M. Lucia, et al., *Development progress of the Materials Analysis and Particle Probe*, **Review of Scientific Instruments** 85 (2014) 11D835

S.A. Sabbagh, et al., *Overview of physics results from the conclusive operation of the National Spherical Torus Experiment*, **Nuclear Fusion** 53 (2013) 104007.

J.C. Schmitt, et al., *Results and future plans of the Lithium Tokamak eXperiment (LTX)*, **Journal of Nuclear Materials** 438 (2013) S1096–S1099

R. Majeski, et al., *Particle control and plasma performance in the Lithium Tokamak eXperiment*, **Physics of Plasmas** 20 (2013) 056103

A. Diallo, et al., *Progress in characterization of the pedestal stability and turbulence during the edge-localized-mode cycle on NSTX*, **Nuclear Fusion** 53 (2013) 093026

R.J. Groebner, et al., *Improved understanding of physics processes in pedestal structure, leading to improved predictive capability for ITER*, **Nuclear Fusion** 53 (2013) 093024

Robert Kaita, et al., *Experiments with liquid metal walls: Status of the lithium tokamak experiment*, **Fusion Engineering and Design** 85, (2010) 874-881

Q.R. Marksteiner, et al., *Studies of a Parallel Force Balance Breaking Instability in a Stellarator*, **AIP Conference Proceedings** 63, (2009) 63-68

Presentations (first-author)

D.P. Boyle, R.E. Bell, R. Kaita, R. Majeski, T.M. Biewer, T.K. Gray, K. Tritz, and K. Widmann, *Impurities in the Lithium Tokamak Experiment*, **56th Annual Meeting of the American Physical Society Division of Plasma Physics**, Oct. 2014

D.P. Boyle, R.E. Bell, R. Kaita, R. Majeski, T.M. Biewer, T.K. Gray, K. Tritz, and K. Widmann, *Measuring the Effects of Lithium Wall-coatings on Impurities in LTX*, **Workshop on Exploratory Topics in Plasma and Fusion Research**, Aug. 2014

D.P. Boyle, R.E. Bell, T.M. Biewer, T.K. Gray, R. Maingi, R. Kaita, and R. Majeski, *Effects of lithium wall-coatings on impurity ions in the Lithium Tokamak Experiment (LTX)*, **41st IEEE International Conference on Plasma Science**, May 2014

D.P. Boyle, R.E. Bell, T.M. Biewer, T.K. Gray, R. Kaita, and R. Majeski, *Improved doppler spectroscopy measurements on LTX*, **55th Annual Meeting of the American Physical Society Division of Plasma Physics,** Nov. 2013

D.P. Boyle, T.M. Biewer, T.K. Gray, R. Maingi, R. Kaita, and R. Majeski, *Passive CHERS measurements in the Lithium Tokamak Experiment (LTX)*, **54th Annual Meeting of the American Physical Society Division of Plasma Physics**, Oct. 2012

D.P. Boyle, J.M. Canik, R. Maingi, P.B. Snyder, and T.H. Osborne, *Varying the pre-discharge lithium wall coatings to alter the characteristics of the ELM-free H-mode pedestal in NSTX*, **20th International Conference on Plasma Surface Interactions**, May 2012

D.P. Boyle, R. Maingi, and J. Canik, *Evolution of ELM-free pedestal structure with lithium wall coatings in NSTX*, **U.S. Transport Taskforce Workshop**, April 2012.

D.P. Boyle, R. Maingi, P.B. Snyder, T.H. Osborne, and J .Manickam, *The relationships between ELM suppression, pedestal profiles, and lithium wall coatings in NSTX*, **53rd Annual Meeting of the American Physical Society Division of Plasma Physics**, Nov. 2011

D.P. Boyle, R. Maingi, J. Manickam, T.H. Osborne, and P.B. Snyder, *Edge profile and stability analysis as ELMs disappear with increasing lithium wall coatings in NSTX,* **52nd Annual Meeting of the American Physical Society Division of Plasma Physics**, Nov. 2010

D.P. Boyle., M.E. Mauel, DT Garnier, J Kesner, *Eddy Currents and Magnetic Reconstruction in LDX*, **51st Annual Meeting of the American Physical Society Division of Plasma Physics**, Nov. 2009

D.P. Boyle, C.H. Skinner, A. Roquemore, *Electrostatic dust detector with improved sensitivity*, **49th Annual Meeting of the American Physical Society Division of Plasma Physics**, Nov. 2007

Awards & Honors

U.S. Delegate to 60th Meeting of Nobel Laureates and Young Researchers in Lindau	2010
U.S. Department of Energy Fusion Energy Sciences Fellowship	2008 – 2011
Faculty Award, Department of Applied Physics, Columbia University	2008
National Undergraduate Fellowship in Plasma & Fusion Energy Science	2007
Dean's List, Columbia University	2004 – 2008

Teaching Experience

Preliminary Exam Review Course – Princeton University 2009
Led twice weekly review for first-year plasma physics graduate students preparing for Physics Preliminary Exam

Outreach Activities

US Department of Energy National Science Bowl	2009 – Present
American Physical Society Plasma Sciences Expo	2009 – Present
Demonstrations at local events with PPPL Science Education	2010 – Present
NUF/SULI homework sessions	2010 – Present
"Fusion Day" outreach to Congress	2013, 2015

References

Robert Kaita	*kaita@pppl.gov*
Richard Majeski	*rmajeski@pppl.gov*
Ronald Bell	*rbell@pppl.gov*
Rajesh Maingi	*rmaingi@pppl.gov*
Tom Kozub	*tkozub@pppl.gov*
Charles Skinner	*cskinner@pppl.gov*
Thomas Pedersen	*thomas.sunn.pedersen@ipp.mpg.de*
Mike Mauel	*mauel@columbia.edu*