

R Alex Tinguely

Curriculum Vitae

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Education

- Jun 2019 **PhD in Plasma Physics**, *Department of Physics, Plasma Science and Fusion Center*, (expected) Massachusetts Institute of Technology, Cambridge, MA, USA, *GPA: 5.0/5.0*.
- May 2014 **BS in Physics and Mathematics**, *summa cum laude and with Honors*, Iowa State University, Ames, IA, USA, *GPA: 3.99/4.0*.
- May 2010 **High School Diploma**, *Valedictorian*, Holy Trinity Catholic High School, Fort Madison, IA, USA.

PhD Thesis (*in progress*)

Title *An analysis of synchrotron radiation from relativistic runaway electrons in the Alcator C-Mod tokamak*

Advisors Dr. Robert Granetz, Dr. Earl Marmor

Committee Prof. Miklos Porkolab, Prof. John Belcher

Description My thesis work focuses on the diagnosis of relativistic “runaway” electrons in tokamak plasmas. Specifically, I study their generation and phase-space dynamics through their synchrotron emission: spectra, images, and polarization.

Publications

1. **RA Tinguely**, KJ Montes, C Rea, and RS Granetz. A survival analysis approach to disruption prediction. Submitted to *Plasma Physics and Controlled Fusion*. (2019)
2. **RA Tinguely**, A Rosenthal, R Simpson, SB Ballinger, AJ Creely, S Frank, AQ Kuang, BL Linehan, W McCarthy, LM Milanese, KJ Montes, T Mouratidis, JF Picard, P Rodriguez-Fernandez, AJ Sandberg, F Sciortino, EA Tolman, M Zhou, BN Sorbom, ZS Hartwig, and AE White. Neutron diagnostics for the physics of a high-field, compact, $Q \geq 1$ tokamak. Submitted to *Fusion Engineering and Design*. (2018)
3. **RA Tinguely**, RS Granetz, M Hoppe, and O Embréus. Spatiotemporal evolution of runaway electrons from synchrotron images in Alcator C-Mod. *Plasma Physics and Controlled Fusion* **60** 124001 (2018): doi:10.1088/1361-6587/aae6ba, arXiv:1810.02742

4. **RA Tinguely**, RS Granetz, M Hoppe, and O Embréus. Measurements of runaway electron synchrotron spectra at high magnetic fields in Alcator C-Mod. *Nuclear Fusion* **58** 076019 (2018): doi:10.1088/1741-4326/aac444, arXiv:1805.05412
5. **RA Tinguely**, RS Granetz, A Berg, AQ Kuang, D Brunner, and B LaBombard. High-resolution disruption halo current measurements using Langmuir probes in Alcator C-Mod. *Nuclear Fusion* **58** 016005 (2018): doi:10.1088/1741-4326/aa8fa6, arXiv:1810.03207
6. KJ Montes, C Rea, RS Granetz, **RA Tinguely**, N Eidiētis, OM Meneghini, DL Chen, B Shen, BJ Xiao, K Erickson, and MD Boyer. Machine learning for disruption warning on Alcator C-Mod, DIII-D, and EAST. Submitted to *Nuclear Fusion*. (2019)
7. C Rea, KJ Montes, RS Granetz, **RA Tinguely**, and K Erickson. A real-time machine learning-based disruption predictor on DIII-D. Submitted to *Nuclear Fusion*. (2019)
8. ML Reinke, S Scott, RS Granetz, JW Hughes, SG Baek, S Shiraiwa, **RA Tinguely**, S Wukitch, and the Alcator C-Mod Team. Avoidance of impurity-induced Current Quench using Lower Hybrid Current Drive. Submitted to *Nuclear Fusion*. (2019)
9. AQ Kuang, NM Cao, AJ Creely, CA Dennett, J Hecla, B LaBombard, **RA Tinguely**, EA Tolman, H Hoffman, M Major, J Ruiz Ruiz, D Brunner, P Grover, C Laughman, BN Sorbom, and DG Whyte. Conceptual design study for heat exhaust management in the ARC fusion pilot plant. *Fusion Engineering and Design* **137** 221–242 (2018): doi:10.1016/j.fusengdes.2018.09.007, arXiv:1809.10555
10. C Rea, RS Granetz, K Montes, **RA Tinguely**, N Eidiētis, JM Hanson, and B Sammuli. Disruption prediction investigations using Machine Learning tools on DIII-D and Alcator C-Mod. *Plasma Physics and Controlled Fusion* **60** 084004 (2018): doi:10.1088/1361-6587/aac7fe
11. M Hoppe, O Embréus, **RA Tinguely**, RS Granetz, A Stahl, and T Fülöp. SOFT: A synthetic synchrotron diagnostic for runaway electrons. *Nuclear Fusion* **58** 026032 (2018): doi:10.1088/1741-4326/aa9abb, arXiv:1709.00674
12. J Boguski, M Brown, R Buttery, R Churchill, W Guttenfelder, G Hammett, J Hanson, D Hatch, C Hegna, M Knolker, X Liu, L Lodestro, R Majeski, R Pinsker, M Shafer, D Sutherland, **RA Tinguely**, E Tolman, and D Weisberg. Discussion Group 5 Summary of USMFRSD Workshop in Austin, TX. Submitted to *The National Academy of Sciences* regarding *A Strategic Plan for US Burning Plasma* (2018)
13. D Shiraki, RS Granetz, N Commaux, LR Baylor, D Brunner, CM Cooper, NW Eidiētis, EM Hollmann, AQ Kuang, CJ Lasnier, RA Moyer, C Paz-Soldan, R Raman, ML Reinke, and **RA Tinguely**. Disruption mitigation in the presence of pre-existing MHD instabilities. *Proceedings of the 26th IAEA Fusion Energy Conference EX/P3-20* (2016)

Presentations

- Jan 2019 *RA Tinguely, RS Granetz, RT Mumgaard, M Hoppe, O Embréus, T Fülöp, and S Scott.* Experimental and synthetic measurements of polarized synchrotron emission from runaway electrons in Alcator C-Mod. Contributed talk, 7th Meeting on Runaway Electron Modeling, Gothenburg, Sweden.
- Nov 2018 *RA Tinguely, RS Granetz, M Hoppe, O Embréus, T Fülöp, S Scott, and RT Mumgaard.* Synchrotron spectra, images, and polarization measurements from runaway electrons in Alcator C-Mod. Selected talk, session on *Research in Support of ITER*, 60th Annual Meeting of the APS Division of Plasma Physics, Portland, OR, USA.
- Jul 2018 *RA Tinguely, RS Granetz, M Hoppe, O Embréus, T Fülöp, and S Scott.* Synchrotron spectra, images, and polarization measurements from runaway electrons in the Alcator C-Mod tokamak. Poster, 45th EPS Conference on Plasma Physics, Prague, Czech Republic.
- Jun 2018 *RA Tinguely, RS Granetz, M Hoppe, O Embréus, T Fülöp, S Scott, and RT Mumgaard.* Using SOFT and CODE to study spatiotemporal dynamics of runaway electrons in Alcator C-Mod. Contributed talk, 6th Meeting on Runaway Electron Modeling, Prague, Czech Republic.
- May 2018 *RA Tinguely, RS Granetz, M Hoppe, O Embréus, and T Fülöp.* Spatiotemporal dynamics of runaway electrons in Alcator C-Mod. Selected talk, US Transport Task Force Workshop, San Diego, CA, USA.
- Oct 2017 *RA Tinguely, RS Granetz, M Hoppe, O Embréus, A Stahl, and T Fülöp.* Synchrotron emission in Alcator C-Mod: Spectra at three magnetic fields, visible camera images, and polarization data. Poster, 59th Annual Meeting of the APS Division of Plasma Physics, Milwaukee, WI, USA.
- Oct 2017 *RA Tinguely, RS Granetz, A Berg, AQ Kuang, D Brunner, and B LaBombard.* Halo current measurements using Langmuir 'rail' probes in Alcator C-Mod. Selected talk, ITPA MHD Workshop, Barcelona, Spain.
- Jun 2017 *A Tinguely, RS Granetz, M Hoppe, O Embréus, A Stahl, and T Fülöp.* Synchrotron emission in Alcator C-Mod: Spectra at three B-fields and visible camera images. Contributed talk, 5th Meeting on Runaway Electron Modeling, Prague, Czech Republic.
- Mar 2017 *A Tinguely, M Hoppe, O Embréus, A Stahl, T Fülöp, and R Granetz.* A first look at the spatial distribution of runaway electrons in Alcator C-Mod. Poster, 9th ITER International School on the *Physics of Disruptions and Control*, Aix-en-Provence, France.
- Nov 2016 *A Tinguely, R Granetz, M Hoppe, A Stahl, and O Embréus.* Analysis of runaway electron synchrotron emission in Alcator C-Mod. Selected talk, session on *Research in Support of ITER*, 58th Annual Meeting of the APS Division of Plasma Physics, San Jose, CA, USA.

- Jun 2016 *A Tinguely, R Granetz, and A Stahl.* Analysis of runaway electron synchrotron emission in Alcator C-Mod. Contributed talk, 4th Meeting on Runaway Electron Modeling, Pertuis, France.
- Nov 2015 *A Tinguely, R Granetz, A Stahl, and R Mumgaard.* Analysis of runaway electron synchrotron radiation in Alcator C-Mod. Contributed talk, 57th Annual Meeting of the APS Division of Plasma Physics, Savannah, GA, USA.
- Nov 2014 *A Tinguely, A Dominguez, A Carpe, and A Zwicker.* Construction and implementation of a novel dust dropper for the PPPL Dusty Plasma Experiment. Poster, 55th Annual Meeting of the APS Division of Plasma Physics, Denver, CO, USA.

Teaching

- Fall 2018 Teaching Assistant for graduate-level course *22.63 Engineering Principles for Fusion Reactors*, taught by Prof. Dennis Whyte—*Advised five-person student team working on the blanket design (materials analysis, neutronics, thermal hydraulics) for a hybrid fusion-fission rocket and power plant. Guided organization and teamwork strategies.*
- Spring 2018 Completed MIT's *Kaufman Teaching Certificate Program*—*Learned how to design courses and organize classes effectively, with emphasis on evidence-based practices, intended outcomes, active learning strategies, inclusive settings, and teaching philosophy. Practiced teaching with undergraduate and graduate students.*
- Summer 2017 Instructor for the Middle East Entrepreneurs of Tomorrow program, based in Jerusalem—*Taught introductory Python to 85 Palestinian and Israeli high school students. Fostered a welcoming and collaborative learning environment.*
- Spring 2017 TA/grader for graduate-level course *8.624 Plasma Waves*, taught by Prof. Miklos Porkolab—*Clarified content, led review sessions, and taught special topics during weekly recitations. Held office hours to meet with students one-on-one.*
- Summer 2016 Co-advised high school student and summer intern, Alexandra Berg, through the Research Science Institute, Center for Excellence in Education—*Alexandra's work on halo currents led to her co-authorship on a publication (Tinguely NF 2018a). She is currently an undergraduate student at MIT.*
- Fall 2015 TA/grader for graduate-level course *8.613J/22.611J Introduction to Plasma Physics*, taught by Prof. Anne White—*Assisted students with problem sets during weekly office hours.*

Honors and Awards

- 2019 4th place, Harvard Black Hole Initiative essay competition, published in *Nautilus*
- 2016/2018 Selected speaker, session on *Research in Support of ITER*, 58th/60th APS DPP
- 2017 Participant, 9th ITER International School on the *Physics of Disruptions and Control*, Aix-en-Provence, France. Awarded travel grant by the US Burning Plasma Organization
- 2014-present Energy Initiative Fellow, Massachusetts Institute of Technology
 - 2014 Student Marshall and Convocation Speaker, College of Liberal Arts and Sciences, ISU
 - 2014 Danielson Award, Department of Physics and Astronomy, ISU
 - 2013 Ruth and Clayton Swenson Award in the Sciences, Phi Beta Kappa, Iowa Zeta Chapter
 - 2013 Jun Ye and Huiquing Wang Award, Dept of Physics and Astronomy, ISU
 - 2012 Schirber Scholarship, Department of Physics and Astronomy, ISU
- 2011/2012 Marian Daniells Scholarship, Department of Mathematics, ISU
- 2010-2014 University Honors Program, ISU
 - 2010 Finalist, National Merit Scholarship

Activities

- 2016-present Co-leader and co-founder of the MIT Plasma Physics Graduate Student Group—*Elevate and promote the status of Plasma Physics within the MIT Physics Department through self-advocacy, meeting with the departmental visiting committee, and inviting plasma physicists for department-wide colloquia.*
- 2015-present Graduate Resident Tutor at Simmons Hall—*Live with and mentor over 300 MIT undergraduate students. Serve and advocate for the academic needs and personal well-being of my students.*
- 2014-present Outreach volunteer for the MIT Plasma Science and Fusion Center—*Coordinate and participate in various outreach efforts including tours of the Alcator C-Mod tokamak, booths at the MIT Energy Night, and demonstrations at the annual APS DPP Expo.*
- 2014-present Member of the MIT Chamber Chorus and MIT Concert Choir

Computational Skills

- Languages Proficient in MATLAB, MDSplus, IDL, LaTeX
Knowledge of Python, Bash, SQL, Mathematica, Java
- Software SOFT [Hoppe *NF* 2018], CODE [Landreman *CPC* 2014], MCNP, Office, COMSOL, AutoCAD
- Systems Linux, Windows

References

Dr. Robert Granetz, Principal Research Scientist, Plasma Science and Fusion Center, MIT
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