

R Alex Tinguely

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Curriculum Vitae

Current

Feb 2022 **Research Scientist**, *Plasma Science and Fusion Center, Massachusetts Institute of Technology*. Energetic particle physics in the SPARC and JET tokamaks: interactions of fast ions and alpha particles with Alfvén Eigenmodes and MHD; generation and mitigation of runaway electrons; diagnosis of fusion neutrons, hard x-rays, and gammas.

Education

Jun 2019 **PhD in Physics**, *Department of Physics, Plasma Science and Fusion Center, 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.

Postdoctoral Research, Jul 2019 - Jan 2022

Employer Plasma Science and Fusion Center, Massachusetts Institute of Technology
Supervisor Prof. Miklos Porkolab
Description Operation, maintenance, and data analysis of the Alfvén Eigenmode Active Diagnostic. Sponsored by EUROfusion and located at the JET tokamak, Culham Centre for Fusion Energy, Abingdon, UK.

PhD Thesis, Aug 2014 - Jun 2019

Title *An analysis of synchrotron radiation from relativistic 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 focused on the diagnosis of relativistic “runaway” electrons in tokamak plasmas. Specifically, I studied their generation and phase-space dynamics through measurements of spectra, images, and polarization of their synchrotron emission.

Publications

1. **RA Tinguely**, I Pusztai, VA Izzo, K Särkimäki, T Fülöp, DT Garnier, RS Granetz, M Hoppe, C Paz-Soldan, A Sundström, and R Sweeney. On the minimum transport required to passively suppress runaway electrons in SPARC. *Plasma Physics and Controlled Fusion* **65** 034002 (2023): doi:10.1088/1361-6587/acb083, arXiv:2301.01435
2. **RA Tinguely**, J Gonzalez-Martin, PG Puglia, N Fil, S Dowson, M Porkolab, I Kumar, M Podestà, M Baruzzo, A Fasoli, YeO Kazakov, MFF Nave, M Nocente, J Ongena, Ž Štancar, and JET Contributors. Simultaneous measurements of unstable and stable Alfvén Eigenmodes in JET. *Nuclear Fusion* **62** 112008 (2022): doi:10.1088/1741-4326/ac899e, arXiv:2208.05052
3. **RA Tinguely**, N Fil, PG Puglia, S Dowson, M Porkolab, V Guillemot, M Podestà, M Baruzzo, R Dumont, A Fasoli, M Fitzgerald, YeO Kazakov, MFF Nave, M Nocente, J Ongena, SE Sharapov, Ž Štancar, and JET Contributors. A novel measurement of marginal Alfvén Eigenmode stability during high power auxiliary heating in JET. *Nuclear Fusion* **62** 076001 (2022): doi:10.1088/1741-4326/ac3c84, arXiv:2111.13569
4. **RA Tinguely**, VA Izzo, DT Garnier, A Sundström, K Särkimäki, O Embréus, T Fülöp, RS Granetz, M Hoppe, I Pusztai, and R Sweeney. Modeling the complete prevention of disruption-generated runaway electron beam formation with a passive 3D coil in SPARC. *Nuclear Fusion* **61** 124003 (2021): doi:10.1088/1741-4326/ac31d7, arXiv:2110.10598
5. **RA Tinguely**, PG Puglia, N Fil, S Dowson, M Porkolab, A Dvornova, A Fasoli, M Fitzgerald, V Guillemot, GTA Huysmans, M Maslov, S Sharapov, D Testa, and JET Contributors. Experimental studies of plasma-antenna coupling with the JET Alfvén Eigenmode Active Diagnostic. *Nuclear Fusion* **61** 026003 (2021): doi:10.1088/1741-4326/abc7eb, arXiv:2011.02768
6. **RA Tinguely**, PG Puglia, N Fil, S Dowson, M Porkolab, A Fasoli, D Testa, and JET Contributors. Results from the Alfvén Eigenmode Active Diagnostic during the 2019–2020 JET deuterium campaign. *Plasma Physics and Controlled Fusion* **62** 115002 (2020): doi:10.1088/1361-6587/aba7f7, arXiv:2007.09412
7. **RA Tinguely** and AP Turner. Optical analogues to the equatorial Kerr–Newman black hole. *Nature Communications Physics* **3** 120 (2020): doi:10.1038/s42005-020-0384-5, arXiv:1909.05256
8. **RA Tinguely**, KJ Montes, C Rea, R Sweeney, and RS Granetz. An application of survival analysis to disruption prediction via Random Forests. *Plasma Physics and Controlled Fusion* **61** 095009 (2019): doi:10.1088/1361-6587/ab32fc, arXiv:1907.04291
9. **RA Tinguely**, M Hoppe, RS Granetz, RT Mumgaard, and S Scott. Experimental and synthetic measurements of polarized synchrotron emission from runaway electrons in Alcator C-Mod. *Nuclear Fusion* **59** 096029 (2019): doi:10.1088/1741-4326/ab2d1d, arXiv:1906.11304

10. **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. *Fusion Engineering and Design* **143** 212-225 (2019): doi:10.1016/j.fusengdes.2019.03.148, arXiv:1903.09479
11. **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
12. **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
13. **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
14. AF Battey, et al. Design of Passive and Structural Conductors for Tokamaks Using Thin-Wall Eddy Current Modeling. *In progress*. (2023)
15. HJC Oliver, et al. Toroidal Alfvén eigenmodes observed in low power JET deuterium-tritium plasmas. *In progress*. (2023)
16. M Fitzgerald, et al. Stability analysis of toroidal Alfvén eigenmodes observed in JET deuterium-tritium internal transport barrier plasmas. Submitted to *Nuclear Fusion*. (2023)
17. M Fitzgerald, et al. Unambiguous observation of toroidal Alfvén eigenmode driven by alpha particles in the Joint European Torus deuterium-tritium experiments. Submitted to *Physical Review Letters*. (2023)
18. AR Saperstein, et al. Disruption halo current rotation scaling on Alcator C-Mod and HBT-EP. *Physics of Plasmas* **30** 042506 (2023): doi:10.1063/5.0140867
19. JX Zhu, et al. Integrated deep learning framework for unstable event identification and disruption prediction of tokamak plasmas. *Nuclear Fusion* **63** 046009 (2023): doi:10.1088/1361-6587/acb083
20. A Braun, et al. Effects of neoclassical tearing modes and toroidal field ripple on lost alpha power in the SPARC tokamak. *Plasma Physics and Controlled Fusion* **64** 125014 (2022): doi:10.1088/1361-6587/ac9ed8
21. M Tardocchi, et al. A high-resolution neutron spectroscopic camera for the SPARC tokamak based on the JET European Torus Deuterium-Tritium experience. *Review of Scientific Instruments* **93** 113512 (2022): doi:10.1063/5.0101779

22. VA Izzo, et al. Runaway electron deconfinement in SPARC and DIII-D by a passive 3D coil. *Nuclear Fusion* **62** 096029 (2022): doi:10.1088/1741-4326/ac83d8, arXiv:2207.12450
23. C Reux, et al. Physics of runaway electrons with Shattered Pellet Injection at JET. *Plasma Physics and Controlled Fusion* **64** 034002 (2022): doi:10.1088/1361-6587/ac48bc
24. P Rodriguez-Fernandez, et al. Overview of the SPARC physics basis towards the exploration of burning-plasma regimes in high-field, compact tokamaks. *Nuclear Fusion* **62** 042003 (2022): doi:10.1088/1741-4326/ac1654
25. N Fil, et al. Interpretation of electromagnetic modes in the sub-TAE frequency range in JET plasmas with elevated monotonic q-profiles. *Physics of Plasmas* **28** 102511 (2021): doi:10.1063/5.0057844
26. JX Zhu, et al. Scenario adaptive disruption prediction study for next generation burning-plasma tokamaks. *Nuclear Fusion* **61** 114005 (2021): doi:10.1088/1741-4326/ac28ae
27. KJ Montes, et al. A Semi-Supervised Detector for Physics Events in Tokamak Discharges. *Nuclear Fusion* **61** 026022 (2021): doi:10.1088/1741-4326/abcd9
28. JX Zhu, et al. A Hybrid Deep Learning architecture for general disruption prediction across tokamaks. *Nuclear Fusion* **61** 026007 (2021): doi:10.1088/1741-4326/abc664
29. R Sweeney, et al. MHD Stability and Disruptions in the SPARC Tokamak. *Journal of Plasma Physics* **86** (5) 865860507 (2020): doi:10.1017/S0022377820001129
30. AJ Creely, et al. Overview of the SPARC Tokamak. *Journal of Plasma Physics* **86** (5) 865860502 (2020): doi:10.1017/S0022377820001257
31. AJ Creely, et al. Design Study of a Combined Interferometer and Polarimeter for a High-Field, Compact Tokamak. *Physics of Plasmas* **27** 042516 (2020): doi:10.1063/1.5142638
32. KJ Montes, et al. Machine learning for disruption warning on Alcator C-Mod, DIII-D, and EAST. *Nuclear Fusion* **59** 096015 (2019): doi:10.1088/1741-4326/ab1df4
33. C Rea, et al. A real-time machine learning-based disruption predictor on DIII-D. *Nuclear Fusion* **59** 096016 (2019): doi:10.1088/1741-4326/ab28bf
34. ML Reinke, et al. Avoidance of impurity-induced Current Quench using Lower Hybrid Current Drive. *Nuclear Fusion* **59** 066003 (2019): doi:10.1088/1741-4326/ab0eb2
35. AQ Kuang, et al. 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

36. *C Rea, et al.* 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
37. *M Hoppe, et al.* SOFT: A synthetic synchrotron diagnostic for runaway electrons. *Nuclear Fusion* **58** 026032 (2018): doi:10.1088/1741-4326/aa9abb, arXiv1709.00674
38. *J Boguski, et al.* 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)
39. *D Shiraki, et al.* Disruption mitigation in the presence of pre-existing MHD instabilities. *Proceedings of the 26th IAEA Fusion Energy Conference EX/P3-20* (2016)

Presentations

- May 2023 *RA Tinguely, P Puglia, S Dowson, M Porkolab, A Fasoli, D Testa, D King, ER Solano, RB Henriques, D Douai, C Perez von Thun, E Delabie, I Jepu, and JET Contributors.* Active MHD spectroscopy with the upgraded JET Alfvén Eigenmode Active Diagnostic. 29th Meeting of the ITPA Topical Group on Energetic Particle Physics, Oak Ridge, TN, USA.
- Oct 2022 *RA Tinguely, M Porkolab, P Puglia, N Fil, S Dowson, M Fitzgerald, D Keeling, HJC Oliver, SE Sharapov, Ž Štancar, R Dumont, J Garcia, YeO Kazakov, PJ Bonofiglo, M Podestà, A Fasoli, and JET Contributors.* Measurements of Alfvén Eigenmode stability in the 2021 JET DT campaign. Selected talk, session on *Research in Support of ITER*, 64th Annual Meeting of the APS Division of Plasma Physics, Spokane, WA, USA.
- Sep 2022 *RA Tinguely.* SPARC: Fast particles & the fastest path to a burning plasma. Invited seminar, Università di Milano-Bicocca, Milan, Italy.
- Sep 2022 *RA Tinguely, VA Izzo, I Pusztai, K Särkimäki, DT Garnier, A Sundström, T Fülöp, RS Granetz, M Hoppe, C Paz-Soldan, R Sweeney, and the SPARC team.* Modeling of runaway electron suppression with a passive 3D coil in SPARC. Invited talk, Varenna – Lausanne International Workshop on the Theory of Magnetic Confinement Systems, Varenna, Italy.
- June 2022 *RA Tinguely, N Fil, P Puglia, S Dowson, M Porkolab, PJ Bonofiglo, R Dumont, A Fasoli, M Fitzgerald, D Keeling, HJC Oliver, M Podestà, SE Sharapov, AA Teplukhina, and JET Contributors.* Exploration of Alfvén Eigenmode physics via active antenna excitation in JET Deuterium, Tritium, and DT plasmas. Contributed poster and paper, 48th EPS Conference on Plasma Physics (virtual).
- Feb 2022 *RA Tinguely, A Braun, S Scott, GJ Kramer, M Podestà.* Effects of MHD on fast ion confinement in SPARC. Invited talk, PPPL Energetic Particle Physics Seminar (virtual).

- Dec 2021 *RA Tinguely, M Porkolab, P Puglia, N Fil, S Dowson, R Coelho, R Dumont, A Fasoli, M Fitzgerald, V. Guillemot, D Keeling, I Kumar, M Podestà, SE Sharapov, AA Teplukhina, and JET Contributors.* Measurements of Alfvén Eigenmode stability in JET D and T plasmas. Contributed talk, 17th IAEA Technical Meeting on Energetic Particles and Theory of Plasma Instabilities in Magnetic Confinement Fusion (virtual).
- Nov 2021 *RA Tinguely, M Porkolab, PG Puglia, A Fasoli, N Fil, S Dowson, M Fitzgerald, D Keeling, SE Sharapov, R Dumont, J Gonzalez Martin, Z Lin, Y Kazakov, J Ongena, M Nocente, M Podestà, AA Teplukhina, Ž Štancar, and JET Contributors.* Alfvén Eigenmode stability measurements in recent JET H, D, T, and DT plasmas. Selected talk, session on *Research in Support of ITER*, 63rd Annual Meeting of the APS Division of Plasma Physics, Pittsburgh, PA, USA (hybrid).
- July 2021 *RA Tinguely, VA Izzo, DT Garnier, A Sundström, K Särkimäki, O Embréus, T Fülöp, RS Granetz, M Greenwald, M Hoppe, I Pusztai, and R Sweeney .* Complete prevention of runaway electron beam formation with a passive 3D coil in SPARC. Invited talk, IAEA-PPPL Theory and Simulation of Disruptions Workshop (virtual).
- June 2021 *RA Tinguely, P Puglia, N Fil, M Porkolab, S Dowson, D Douai, R Dumont, A Fasoli, M Fitzgerald, SE Sharapov, and JET Contributors.* Exploration of Alfvén Eigenmode physics via active antenna excitation in JET deuterium and hydrogen plasmas. Contributed poster and paper, 47th EPS Conference on Plasma Physics (virtual).
- May 2021 *RA Tinguely, N Fil, PG Puglia, S Dowson, M Porkolab, V Guillemot, M Podestà, M Baruzzo, A Fasoli, M Fitzgerald, Y Kazakov, MFF Nave, M Nocente, J Ongena, SE Sharapov, Ž Štancar, and JET Contributors.* A novel measurement of marginal Alfvén Eigenmode stability during high power auxiliary heating in JET. Contributed talk, 25th Meeting of ITPA Topical Group on Energetic Particle Physics (virtual).
- May 2021 *RA Tinguely, M Porkolab, N Fil, P Puglia, V Aslanyan, D Borba, S Dowson, R Dumont, A Fasoli, M Fitzgerald, Z Lin, SE Sharapov, D Testa, and JET Contributors.* Experimental and computational investigations of Alfvén Eigenmode stability in JET plasmas through active antenna excitation. Contributed poster and paper, 28th IAEA Fusion Energy Conference (virtual).
- Nov 2020 *RA Tinguely, N Fil, P Puglia, M Porkolab, S Dowson, N Dreval, R Dumont, A Fasoli, M Fitzgerald, Y Kazakov, D Keeling, Z Lin, M Nocente, J Ongena, S Sharapov, D Testa, and JET Contributors.* Novel measurements of Alfvén Eigenmode stability via active antenna excitation in JET plasmas. Contributed talk, 62nd Annual Meeting of the APS Division of Plasma Physics (virtual).
- Oct 2020 *RA Tinguely, N Fil, P Puglia, M Porkolab, S Dowson, N Dreval, R Dumont, A Dvornova, A Fasoli, M Fitzgerald, V Guillemot, GTA Huysmans, Y Kazakov, D Keeling, Z Lin, M Maslov, M Nocente, J Ongena, S Sharapov, Z Stancar, D Testa, and JET Contributors.* An overview of recent AE stability measurements on JET. Contributed talk, 24th Meeting of ITPA Topical Group on Energetic Particle Physics (virtual).

- Jan 2020 *RA Tinguely, N Hawkes, E Rachlew, M Hoppe, O Ficker, C Reux, M Lehnen, N Eidiotis, S Silburn, and JET Contributors.* Polarized synchrotron emission from post-disruption runaway electrons in the JET C38 campaign. Contributed talk, 8th Meeting on Runaway Electron Modeling, Gothenburg, Sweden.
- Oct 2019 *RA Tinguely, KJ Montes, C Rea, R Sweeney, and RS Granetz.* Plasma survival analysis: estimating survival probabilities and expected lifetimes from binary classification and Random Forests. Invited talk, 24th Workshop on MHD Stability Control, New York City, NY, USA.
- Oct 2019 *RA Tinguely, O Embréus, T Fülöp, L Hesslow, M Hoppe, P Svensson, O Vallhagen, S Newton, P Helander, AJ Creely, D Garnier, RS Granetz, N Howard, P Rodriguez-Fernandez, R Sweeney, and the SPARC team.* Runaway electrons in SPARC. Contributed talk, 61st Annual Meeting of the APS Division of Plasma Physics, Fort Lauderdale, FL, USA.
- May 2019 *RA Tinguely.* An analysis of synchrotron radiation from relativistic electrons in the Alcator C-Mod tokamak. Doctoral Thesis Defense, MIT, Cambridge, MA, USA.
- 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.
- Jul 2016 *A Tinguely, R Granetz, and A Stahl.* Analysis of runaway electron synchrotron emission in Alcator C-Mod. Invited talk, 4th Annual Theory and Simulation of Disruptions Workshop, Princeton, NJ, 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 2013 *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.

Service to profession

- Peer review *Review of Scientific Instruments; Fusion Engineering and Design; Journal of Plasma Physics; Nuclear Fusion; Physics of Plasmas; Plasma Physics and Controlled Fusion; IEEE Transactions on Plasma Science; US Department of Energy, Office of Science, Fusion Energy Sciences*
- Organizer SPARC Neutron Diagnostics Workshop, 27-28 September 2022 (virtual)
- Participant DOE FESAC Long Range Planning Workshop, 20 August 2020; IAEA Technical Meeting on Plasma Disruptions and their Mitigation, 20-23 July 2020; US Magnetic Fusion Research Strategic Directions Workshop, 11-15 December 2017, Austin, TX

Teaching and Mentorship

- Present Supervisor to graduate students John Ball and Yiru Xiao, and postdoctoral associates Xinyan Wang and John Boguski; co-supervisor to graduate student Shon Mackie and postdoctoral associate Enrico Panontin
- Summer 2021 Advisor to university student, Iyngkarran Kumar, for a three-month internship at the UK Atomic Energy Authority, carried out remotely due to COVID-19 - *Iyngkarran assembled a database of destabilized Alfvén Eigenmodes in JET to discover empirical trends and compare with theory and simulation.*
- Summer 2021 Co-advisor to university student, Anson Braun, for a three-month internship at the Princeton Plasma Physics Laboratory, carried out remotely due to COVID-19 - *Anson used the orbit-following code SPIRAL to calculate the effects of neoclassical tearing modes on alpha particle confinement in SPARC.*
- Spring 2021 Co-advisor to university student, Nathaniel Shields, for a three-month internship at Commonwealth Fusion Systems, carried out remotely due to COVID-19 - *Nathaniel performed ASCOT orbit-following simulations to assess first wall heating of lost alpha particles in SPARC. His work has informed engineering tolerances for the vacuum vessel and limiters.*
- Fall 2020 Advisor to university student, Victor Guillemot, for a five-month internship at the Culham Centre for Fusion Energy, carried out remotely due to COVID-19 - *Victor performed statistical and analytical analyses of "big data" collected by the Alfvén Eigenmode Active Diagnostic at JET. His work led to co-authorships on multiple publications including [Tinguely NF 2021a].*
- Summer 2020 Instructor for the Middle East Entrepreneurs of Tomorrow program, held remotely due to COVID-19 - *Taught introductory Python online to 40 Israeli and Palestinian high school students. Created an inclusive and collaborative virtual learning environment.*
- 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 went on to complete her undergraduate degree 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

- 2023 Invited speaker, session on the *Future of Fusion*, MIT Energy Conference
- 2022, 2021, 2018, 2016 Selected speaker, session on *Research in Support of ITER*, APS DPP
- 2020 Workforce Development Highlight, US DOE Office of Science, Office of Workforce Development for Teachers and Scientists
- 2019 4th place, Harvard Black Hole Initiative essay competition, published in *Nautilus*
- 2018 Credited in the documentary *Imagination Off the Charts: Jacob Collier comes to MIT*, winner of a New England Emmy Award
- 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
- 2015-2017 Educational Outreach Award, MIT Plasma Science and Fusion Center
- 2014-2019 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 Huiqing 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, Iowa State University (ISU)
- 2010 Finalist, National Merit Scholarship

Activities

- 2023-present Co-founder and Steering Committee member of the Advocacy Group on Diversity, Equity, Inclusion, and Accessibility (DEIA) - *Hear DEIA ideas and concerns at MIT's Plasma Science and Fusion Center, and propose and advocate DEIA efforts to leadership.*
- 2022-present Member of the choir Chorus pro Musica; performances in Carnegie Hall, Boston's Symphony Hall, TD Garden
- 2019-2021 Member of the Oxford Bach Choir; volunteer at the Gatehouse, Oxford
- 2016-2019 Co-leader and co-founder of the MIT Plasma Physics Graduate Student Group - *Elevated and promoted 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.*
- 2015-2019 Graduate Resident Tutor at Simmons Hall - *Lived with and mentored over 300 MIT undergraduate students. Served and advocated for the academic needs and personal well-being of my students.*
- 2014-2019 Outreach volunteer for the MIT Plasma Science and Fusion Center - *Coordinated and participated 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.*

Computational Skills

- Languages Proficient in Python, MATLAB, MDSplus, IDL, LaTeX
Knowledge of Bash, SQL, Mathematica, Java
- Software ORBIT [White 1984 Physics of Fluids]
NOVA-K [Fu 1994 Physics of Fluids B]
ASCOT [Varje 2019 arXiv]
CASTOR [Huysmans 1995 Physics of Plasmas]
MISHKA [Mikhailovskii 1997 *Plasma Physics Reports*]
CSCAS [Huysmans 2001 *Physics of Plasmas*]
HELENA [Huysmans 1991 *International Journal of Modern Physics C*]
GTC: Gyrokinetic Toroidal Code [Lin 1998 *Science*]
SOFT: Synchrotron-detecting Orbit-Following Toolkit [Hoppe 2018 *Nuclear Fusion*]
CODE: COLLisional Damping of Electrons [Landreman 2014 *Comp. Phys. Comm.*]
GO+CODE [Hoppe 2020 *Journal of Plasma Physics*]
MaxwellFDFD [Shin 2012 *Journal of Computational Physics*]
MCNP6: Monte Carlo N-Particle [Goorley 2012 *Nuclear Technology*]
OpenMC [Romano 2015 *Ann. Nucl. Energy*]
AutoCAD, COMSOL, Office
- Systems Linux, Windows