RISHABH DATTA

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EDUCATION

Massachusetts Institute of Technology **2022-2024**
Ph.D. in Mechanical Engineering *Cambridge, MA*
Thesis: "*Radiatively Cooled Magnetic Reconnection Experiments Driven by Pulsed Power*" *GPA: 5.0/5.0*

Massachusetts Institute of Technology **2019-2022**
S.M. in Mechanical Engineering *Cambridge, MA*
Thesis: *"High Energy Density Shocks in Magnetized Hypersonic Plasma Flows"* *GPA: 5.0/5.0*

Georgia Institute of Technology **2015-2019**
B.S. in Mechanical Engineering (Highest Honors) *GPA: 3.97/4.0*

RESEARCH EXPERIENCE

Postdoctoral Associate, Plasma Science & Fusion Center, MIT **2024-Present**
• Computational modeling of MHD disruptions & runaway electrons in magnetic fusion devices *Cambridge, MA*

Research Assistant, MIT **2020-2024**
Supervisor: Dr Jack D Hare *Cambridge, MA*
• First laboratory experiments of magnetic reconnection in a radiation-dominated regime
• High-fidelity computational modeling (magnetohydrodynamics, radiation transport) of pulsed power-driven reconnection
• Led the MARZ collaboration (MIT, Sandia National Labs, Princeton, Imperial College, Oxford, and others)

Computational Research Intern, Technical University Munich **2018**
Supervisor: Dr Stefan Adami *Munich, Germany*
• Developed Riemann solver(s) in C++ for compressible multiphase flow modeling

Undergraduate Researcher, Solar Fuels & Technologies Lab, Georgia Tech **2017-2018**
Supervisor: Dr Peter Loutzenhiser *Atlanta, GA*
• Thermodynamic characterization of novel fuels for thermochemical concentrated solar reactors

AWARDS, HONORS & FELLOWSHIPS

Fellowships
• Schmidt Science Fellowship (Finalist) **2024**
• MIT College of Engineering Exponent Fellowship ($42,000) (1 selected, institution) **2023**
• MIT MathWorks Fellowship ($84,000) **2022**
• First Year Graduate Student Fellowship, Caltech (declined) **2019**
• Diversity, Equity, and Inclusion Fellowship, Georgia Tech (20 selected, institution) **2018**

Research Awards & Grants
• Igor Alexeff Outstanding Student in Plasma Science Award ($2000) (1 selected, international) **2024**
• Editors' Suggestion, *Physical Review Letters* (1 in 6 accepted Letters) **2024**
• Editors' Pick, *Physics of Plasmas* **2024**
• ZNetUS Program Grant ($50,000) **2024**
• Finalist, De Florez Competition **2024**
• Wunsch Foundation Silent Hoist and Crane Outstanding Student Award ($1500) (2 selected, department) **2023**
• Travel Award, International Magnetic Reconnection Workshop **2023**
• Finalist, Best Student Paper, IEEE International Conference on Plasma Science (5 selected, conference) **2023**
• First Prize, MIT Machine Learning for Engineering Design Expo **2022**
• Keck Award in Thermal Sciences, MIT ($1500) (1 selected, department) **2021**
• GSC Conference Grant, MIT ($1000) (1 selected, institute) **2021**
• Honorable Mention, Mechanical Engineering Research Exhibition, MIT **2021**
• President's Undergraduate Research Award, Georgia Tech ($1500) **2018**
• Practical Research Experience Program Scholarship, Technical University Munich (€5000) (20 selected, national) **2018**

Other Academic Awards

- Faculty Honors, Georgia Tech **2018, 2017, 2016, 2015**
- Dean's List, Georgia Tech **2018**
- A*STAR Scholarship, Ministry of Education, Singapore (10 selected, national) **2010-2014**

PUBLICATIONS (7 first author)

[8] **R. Datta,** K. Chandler, C. E. Myers, J. P. Chittenden, A. J. Crilly, C. Aragon, D. J. Ampleford, J. T. Banasek, A. Edens, W. R. Fox, S. B. Hansen, E. C. Harding, C. A. Jennings, H. Ji, C. C. Kuranz, S. V. Lebedev, Q. Looker, S. G. Patel, A. Porwitzky, G. A. Shipley, D. A. Uzdensky, D. A. Yager-Elorriaga, J.D. Hare (2024). "Plasmoid Formation and Strong Radiative Cooling in a Driven Magnetic Reconnection Experiment." ***Physical Review Letters. Editors' Suggestion.*** https://doi.org/10.1103/physrevlett.132.155102

[7] **R. Datta,** K. Chandler, C. E. Myers, J. P. Chittenden, A. J. Crilly, C. Aragon, D. J. Ampleford, J. T. Banasek, A. Edens, W. R. Fox, S. B. Hansen, E. C. Harding, C. A. Jennings, H. Ji, C. C. Kuranz, S. V. Lebedev, Q. Looker, S. G. Patel, A. Porwitzky, G. A. Shipley, D. A. Uzdensky, D. A. Yager-Elorriaga, J.D. Hare (2024). "Radiatively cooled magnetic reconnection experiments driven by pulsed power." ***Physics of Plasmas. Invited Paper, Editors' Pick, and Cover Article.*** https://doi.org/10.1063/5.0201683

[6] **R. Datta,** A. J. Crilly, J. P. Chittenden, S. Chowdhry, K. Chandler, N. Chaturvedi, C. E. Myers, W. R. Fox, S. B. Hansen, C. A. Jennings, H. Ji, C. C. Kuranz, S. V. Lebedev, D. A. Uzdensky, J. D. Hare (2024). "Simulations of radiatively cooled magnetic reconnection driven by pulsed-power." *Journal of Plasma Physics*. https://doi.org/10.1017/S0022377824000448

[5] **R. Datta**., F. Ahmed, J.D. Hare. "Machine learning assisted analysis of visible spectroscopy in pulsed-power-driven plasmas." *IEEE Transactions on Plasma Science.* (2024) https://doi.org/10.1109/TPS.2024.3364975

[4] **R. Datta,** J. Angel, J. B. Greenly, S. N. Bland, J. P. Chittenden, E. S. Lavine, W. M. Potter D. Robinson, T. W. O. Varnish, E. Wong, D. A. Hammer, B. R. Kusse, J. D. Hare. "Plasma flows during the ablation stage of an over-massed pulsed-power-driven exploding planar wire array." *Physics of Plasmas* 30, no. 9 (2023). https://doi.org/10.1063/5.0160893

[3] **R. Datta,** D.R. Russell, I. Tang, T. Clayson, L.G. Suttle, J.P. Chittenden, S.V. Lebedev, and J.D. Hare. "The Structure of 3-D Collisional Magnetized Bow Shocks in Pulsed-Power-Driven Plasma Flows." *Journal of Plasma Physics* 88, no. 6 (2022): 905880604. https://doi.org/10.1017/S0022377822001118

[2] **R. Datta,** D. R. Russell, I. Tang, T. Clayson, L. G. Suttle, J. P. Chittenden, S. V. Lebedev, and J. D. Hare. "Time-Resolved Velocity and Ion Sound Speed Measurements from Simultaneous Bow Shock Imaging and Inductive Probe Measurements." *Review of Scientific Instruments* 93, no. 10 (2022): 103530. https://doi.org/10.1063/5.0098823.

[1] H. E. Bush, **R. Datta**, and P. G. Loutzenhiser. "Aluminum-doped strontium ferrites for a two-step solar thermochemical air separation cycle: Thermodynamic characterization and cycle analysis." *Solar Energy* 188 (2019): 775-786. https://doi.org/10.1016/j.solener.2019.06.059

Preprints (Under Review)

[P.1] T. Varnish, Chen, J., S. Chowdhry, **R. Datta**, G. V. Dowhan, L. S. Horan IV, N. M. Jordan, E. R. Neill et al. "Quadrupolar Density Structures in Driven Magnetic Reconnection Experiments with a Guide Field." Submitted to *Phys. Plasmas*. (2024) *arXiv:2412.02556* (2024).

PRESS

- Nature Astronomy "Magnetic Reconnection on Z experiments."
- AIP Scilights "Accessing a new regime of reconnection."
- MIT PSFC News. "Recreating celestial X-ray bursts in a lab"
- MIT News "Exploring the bow shock and beyond. Rishabh Datta seeks to further understanding of astrophysical phenomena."

GRANT WRITING

- Lead; ZNetUS FY24-25 ($50,000)
- Co-investigator; Z Fundamental Science Program FY23-24 (awarded experimental time worth ~$1M)

SELECTED TALKS & PRESENTATIONS

- American Physical Society (APS) Division of Plasma Physics Meeting, Atlanta, GA. *Contributed Talk.* **2024**
- American Physical Society (APS) Division of Plasma Physics Meeting, Denver, CO. *Invited Talk.* **2023**
- Z Fundamental Science Workshop (Virtual). *Invited Plenary Talk.* **2023**
- Dense Z Pinch Conference, Ann Arbor, MI. Contributed talk. **2023**
- International Magnetic Reconnection Workshop, Japan. Contributed talk. **2023**
- International Conference on Plasma Science, Santa Fe, NM. *Best Student Paper Finalist Talk.* **2023**
- MIT PSFC-NSF Meeting, Cambridge, MA. *Invited talk.* **2023**
- MIT Machine Learning for Engineering Design Expo, Cambridge, MA. *Best Poster Award.* **2022**
- APS Division of Plasma Physics Meeting, Spokane, WA. Contributed talk. **2022**
- MIT HEDP-Imperial College Meeting. *Invited Talk.* **2021**
- High Temp. Plasma Diagnostics, Rochester, NY. Contributed poster. **2022**
- APS Division of Plasma Physics Meeting, Pittsburgh, PA. Contributed poster. **2021**
- MIT-Imperial College Meeting (Virtual). *Invited Talk.* **2021**
- MIT Graduate Association of Mechanical Engineers Lunch Seminar. **2021**

TEACHING & MENTORSHIP

- **Teaching Assistant,** 2.005 Thermal-Fluids Engineering, MIT **2024**
  Delivered lectures and prepared teaching/examination materials; 75 undergraduate students.
- **Teaching Assistant,** Mechanical Engineering Advanced Fluid Mechanics Qualifying Exam, MIT **2022**
  Weekly review sessions to support students' preparation
- **The Professor's Toolkit Teaching Course,** MIT **2024**
- **Teaching Days Course,** MIT **2024**
  Training courses on teaching practice and pedagogy
- **Graduate Student Coach,** MIT **2021-2022**
  Provided professional mentorship and guidance to Ph.D. students
- **Undergraduate Researcher (UROP) Advisor**, MIT **2022-Present**
  Mentored 7 undergraduate students on research projects I proposed. Nominated for Best UROP Mentor.
  1) S. Engebretson (Summer 2024): Oblique shocks in high energy density plasmas.
  2) E. Neill (Spring 2023-Present): Measuring the adiabatic index in high energy density plasmas.
  3) O. Odiase (Spring-Summer 2023): Construction and testing of a 1kA pulsed-power device.
  4) D. Robinson (Spring 2023): Mach-Zehnder interferometry measurements in planar wire arrays.
  5) J. Atkinson (January 2023): Construction and testing of a 1kA pulsed-power device.
  6) J. Arevalo (Spring-Fall 2023): Design and modeling of a 1kA pulsed-power device.
  7) E. Wong (Fall 2022): Three-dimensional MHD modeling of planar wire arrays.
- **Graduate Application Assistance Mentor,** MIT **2024-Present**
  Mentored underrepresented students in graduate school applications to the Mechanical Engineering program

SERVICE & LEADERSHIP

- **Journal Peer Reviewer** **2023-2024**
  - Physical Review Letters
  - Physics of Plasmas
- **Sustainability**
  - Chair, MIT GSC Sustainability Committee **2020-2022**
  - Chair, MIT Sustainability Fund **2020-2022**
  - Graduate Student Representative, MIT Student Sustainability Coalition **2022-23**
  - Organizer**,** IPCC 6th Assessment Report Workshop, MIT **2022**
  - Organizer, Sustainability Summer Book Club, MIT **2021**
  - Organizer, Graduate Student Sustainable Living Series, MIT **2021-2022**
  - Organizer, Climate Action Plan Student Workshops, MIT **2021**
  - Organizer, MIT GSC Sustainability Hackathon **2021**

SERVICE & LEADERSHIP (contd.)

• Community & Leadership

- Member, Housing and Community Affairs, MIT Graduate Student Council **2020-2022**
- Peer Mentor to First-Year Ph.D. Students, Graduate Association of Mechanical Engineers **2022-23**
- Diversity and Inclusion Fellow, Georgia Tech **2018**
- Executive Board Member, Georgia Tech Mental Health Student Coalition **2017**
- Chair, Council of Grad Life, Georgia Tech **2017-2019**
- Diversity & Inclusion Chair, Student Center Programs Council, Georgia Tech **2016-2017**
- Committee Chair, Student Government Association, Georgia Tech **2016-2017**