Jack Davies Hare

Curriculum Vitae, July 2024

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Education

2013–2017 **Imperial College London**, PhD, Plasma Physics

2011–2013 **Princeton University**, MA, Plasma Physics

2007–2011 **University of Cambridge**, 1st Class BA (hons) and MSci, Natural Sciences

Employment

From 2025 ***Cornell University***, *Assistant Professor, School of Electrical and Computer Engineering*

2021–2024 **Massachusetts Institute of Technology**, Assistant Professor, Walter Henry Gayle (1929) Career Development Chair, Department of Nuclear Science and Engineering

2020–2021 **Imperial College London**, Post-doctoral Research Associate

2019–2020 **Max-Planck Institute for Plasma Physics**, Post-doctoral Research Associate

2017–2019 **Imperial College London**, Post-doctoral Research Associate

Selected Awards

2024 MIT School of Engineering Ruth and Joel Spira Award for Distinguished Teaching.

2023 Michigan Institute for Plasma Science and Engineering (MIPSE) Early Career Award.

2018 European Physical Society Plasma Physics Division PhD Research Award.

2018 Imperial College Prize for Excellence in the Support of Teaching and Learning.

Selected Grants

2023 PI, NSF CAREER Award. $850k.

2023 Co-PI, MACH NNSA Center of Excellence. $750k.

2022-2024 Sub-award from ARPA-E OPEN grant led by Eden Inc. on electrohydraulic fracturing. $500k.

2022-2024 PI, NSF EAGER: "Radiatively Cooled Magnetic Reconnection on Z". $218k.

2021-2024 PI, NSF/NNSA: "Developing Pulsed Power Driven Turbulent Reconnection Platforms". $750k.

2021–2025 Academic PI the Magnetically Ablated Reconnection on Z (MARZ) collaboration, awarded seven shots (∼$5M) through the Z Fundamental Science Program

Selected Invited Talks

Apr. 2024 Joint IAS/Princeton Astrophysics Colloquium, Princeton, NJ

Mar. 2024 ECLIPSE Confernece, Rochester, NY

Mar. 2024 Plasma Seminar, UC Los Angeles, CA

Sep. 2023 ECE Seminar, Cornell University, NY

June 2023 MagNetUS Annual Meeting, Auburn University, AL

Mar. 2023 MIPSE Seminar, University of Michigan, Ann Arbor MI

Oct. 2022	Plasma Physics Colloquium, Columbia University, NY
Oct. 2022	Center for Integrated Plasma Studies Seminar, CU Boulder, CO
Aug. 2022	Z Fundamental Science Workshop, Albuquerque, NM
May. 2022	Magnetic Reconnection Workshop, Monterey CA
April 2022	Z Fundamental Science Seminar, SNL, Albuquerque NM
Feb. 2022	NNSA Stockpile Stewardship Academic Program Workshop, Virtual
Jan. 2022	Plasma, Pulsed Power, and Microwave Lab Seminar, U. Michigan, Ann Arbor MI
Aug. 2021	Z Fundamental Science Workshop, Virtual
May 2021	High Energy Density Science Association Colloquium
July 2020	Heliophysics seminar, Princeton Plasma Physics Laboratory
July 2020	Frontiers in Plasma Physics, Journal of Plasma Physics Colloquium
Jan. 2019	Plasma Theory Group Seminar, University of Oxford, UK
Oct. 2017	APS Division of Plasma Physics Annual Meeting, Milwaukee, WI
March 2017	Magnetic Reconnection US-Japan Workshop 2017, Matsuyama, Japan

Academic Service

2024	APS DPP Nominating Committee.
2023	IEEE ICOPS Conference Technical Area Lead.
2021	APS DPP Program Committee, Fundamental Science sub-committee.
2021–2024	MIT NSE departmental DEI committee.
2021–2023	APS Division of Plasma Physics Pride (LGBTQ+) committee, member-at-large.
From 2020	Advisory Board member for the Journal of Plasma Physics.
From 2017	Referee for *Physical Review Letters*, *Nature*, *Physical Review E*, *Journal of Plasma Physics*, *Review of Scientific Instruments*, and *Physics of Plasmas*, among others.
2018–2019	Chair of Imperial College Physics Department LGBT+ Allies Network.

Selected Teaching Experience

From 2021	Advisor to five graduate students and eight undergraduate students at MIT.
2021–2024	Instructor, 22.62, Fusion Energy for graduate students at MIT (Spring).
2021-2023	Instructor, 22.67 Principles of Plasma Diagnostics for graduate students (Fall 2021, 2023).
2022-2024	Instructor, 22.911 graduate seminar series.
Spring 2023	Instructor, 22.901, High Energy Density Physics for graduate students at MIT.
Fall 2022	Co-instructor, 22.033, Senior Design project for MIT Nuclear Engineering undergraduates.
2017–2018	Head of Experiment (Interferometry), first year undergraduate labs at Imperial College.
2017–2018	BSc Project supervisor, continuous wave triature interferometer for HED plasmas.
2014–2016	Demonstrator for 2nd year physics undergraduate labs at Imperial College.
2014–2016	Supervisor for first year projects for physics undergraduates at Imperial College.

Publications

Thirty-four publications, of which five are first author and seven are last author.

34. 2024 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, and **J. D. Hare**. "Plasmoid Formation and Strong Radiative Cooling in a Driven Magnetic Reconnection Experiment". *Physical Review Letters* 132.15, p. 155102. DOI: 10.1103/PhysRevLett.132.155102.

33. 2024 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, and **J. D. Hare**. "Radiatively Cooled Magnetic Reconnection Experiments Driven by Pulsed Power". *Physics of Plasmas* 31.5, p. 052110. DOI: 10.1063/5.0201683.

32. 2024 R. Datta, A. 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, and **J. D. Hare**. "Simulations of Radiatively Cooled Magnetic Reconnection Driven by Pulsed Power". *Journal of Plasma Physics* 90.2, p. 905900215. DOI: 10.1017/S0022377824000448.

31. 2024 R. Datta, F. Ahmed, and **J. D. Hare**. "Machine-Learning-Assisted Analysis of Visible Spectroscopy in Pulsed-Power-Driven Plasmas". *IEEE Transactions on Plasma Science*, pp. 1–9. DOI: 10.1109/TPS.2024.3364975.

30. 2024 J. A. Pearcy, M. J. Rosenberg, T. M. Johnson, G. D. Sutcliffe, B. L. Reichelt, **J. D. Hare**, N. F. Loureiro, R. D. Petrasso, and C. K. Li. "Experimental Evidence of Plasmoids in High-beta Magnetic Reconnection". *Physical Review Letters* 132.3, p. 035101. DOI: 10.1103/PhysRevLett.132.035101.

29. 2023 S. Merlini, **J. D. Hare**, G. C. Burdiak, J. W. D. Halliday, A. Ciardi, J. P. Chittenden, T. Clayson, A. J. Crilly, S. J. Eardley, K. E. Marrow, D. R. Russell, R. A. Smith, N. Stuart, L. G. Suttle, E. R. Tubman, V. Valenzuela-Villaseca, T. W. O. Varnish, and S. V. Lebedev. "Radiative Cooling Effects on Reverse Shocks Formed by Magnetized Supersonic Plasma Flows". *Physics of Plasmas* 30.9, p. 092102. DOI: 10.1063/5.0160809.

29. 2023 S. Merlini, **J. D. Hare**, G. C. Burdiak, J. W. D. Halliday, A. Ciardi, J. P. Chittenden, T. Clayson, A. J. Crilly, S. J. Eardley, K. E. Marrow, D. R. Russell, R. A. Smith, N. Stuart, L. G. Suttle, E. R. Tubman, V. Valenzuela-Villaseca, T. W. O. Varnish, and S. V. Lebedev. "Radiative Cooling Effects on Reverse Shocks Formed by Magnetized Supersonic Plasma Flows". *Physics of Plasmas* 30.9, p. 092102. DOI: 10.1063/5.0160809.

28. 2023 V. Valenzuela-Villaseca, L. G. Suttle, F. Suzuki-Vidal, J. W. D. Halliday, S. Merlini, D. R. Russell, E. R. Tubman, **J. D. Hare**, J. P. Chittenden, M. E. Koepke, E. G. Blackman, and S. V. Lebedev. "Characterization of Quasi-Keplerian, Differentially Rotating, Free-Boundary Laboratory Plasmas". *Physical Review Letters* 130.19, p. 195101. DOI: 10.1103/PhysRevLett.130.195101.

27. 2023 S. Jahanbakhsh, J. D. Hare, H. Meister, C. Ingesson, M. Majewski, F. Penzel, S. Schmitt, U. Walach, and M. Dubois. "Calibration and Thermal Test Results of Prototype Bolometer Sensors for ITER Fusion Reactor". *Review of Scientific Instruments* 94.3, p. 033503. DOI: 10.1063/5.0134449.

26. 2022 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* 93.10, p. 103530. DOI: 10.1063/5.0098823.

25. 2022 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* 88.6, p. 905880604. DOI: 10.1017/S0022377822001118.

24. 2022 D. R. Russell, G. C. Burdiak, J. J. Carroll-Nellenback, J. W. D. Halliday, **J. D. Hare**, S. Merlini, L. G. Suttle, V. Valenzuela-Villaseca, S. J. Eardley, J. A. Fullalove, G. C. Rowland, R. A. Smith, A. Frank, P. Hartigan, A. L. Velikovich, J. P. Chittenden, and S. V. Lebedev. "Perpendicular Subcritical Shock Structure in a Collisional Plasma Experiment". *Physical Review Letters* 129.22, p. 225001. DOI: 10.1103/PhysRevLett.129.225001.

23. 2021 **J. D. Hare**, G. C. Burdiak, S. Merlini, J. P. Chittenden, T. Clayson, A. J. Crilly, J. W. D. Halliday, D. R. Russell, R. A. Smith, N. Stuart, L. G. Suttle, and S. V. Lebedev. "An Imaging Refractometer for Density Fluctuation Measurements in High Energy Density Plasmas". *Review of Scientific Instruments* 92.3, p. 033521. DOI: 10.1063/5.0040919.

22. 2021 L. G. Suttle, **J. D. Hare**, J. W. D. Halliday, S. Merlini, D. R. Russell, E. R. Tubman, V. Valenzuela-Villaseca, W. Rozmus, C. Bruulsema, and S. V. Lebedev. "Collective Optical Thomson Scattering in Pulsed-Power Driven High Energy Density Physics Experiments (Invited)". *Review of Scientific Instruments* 92.3, p. 033542. DOI: 10.1063/5.0041118.

22. 2021 J. W. D. Halliday, S. N. Bland, J. D. Hare, S. Parker, L. G. Suttle, D. R. Russell, and S. V. Lebedev. "A Time-Resolved Imaging System for the Diagnosis of x-Ray Self-Emission in High Energy Density Physics Experiments". *Review of Scientific Instruments* 92.12, p. 123507. DOI: 10.1063/5.0073174.

20. 2021 E. D. Filippov, S. S. Makarov, K. F. Burdonov, W. Yao, G. Revet, J. Béard, S. Bolaños, S. N. Chen, A. Guediche, **J. Hare**, D. Romanovsky, I. Y. Skobelev, M. Starodubtsev, A. Ciardi, S. A. Pikuz, and J. Fuchs. "Enhanced X-ray Emission Arising from Laser-Plasma Confinement by a Strong Transverse Magnetic Field". *Scientific Reports* 11.1, p. 8180. DOI: 10.1038/s41598-021-87651-8.

19. 2019 **J. D. Hare**, J. MacDonald, S. N. Bland, J. Dranczewski, J. W. D. Halliday, S. V. Lebedev, L. G. Suttle, E. R. Tubman, and W. Rozmus. "Two-Colour Interferometry and Thomson Scattering Measurements of a Plasma Gun". *Plasma Physics and Controlled Fusion* 61.8, p. 085012. DOI: 10.1088/1361-6587/ab2571.

18. 2019 L. G. Suttle, G. C. Burdiak, C. L. Cheung, T. Clayson, J. Halliday, **J. D. Hare**, S. Rusli, D. Russell, E. Tubman, A. Ciardi, N. F. Loureiro, J. Li, A. Frank, and S. V. Lebedev. "Interactions of Magnetized Plasma Flows in Pulsed-Power Driven Experiments". *Plasma Physics and Controlled Fusion*. DOI: 10.1088/1361-6587/ab5296.

17. 2018 **J. D. Hare**, L. G. Suttle, S. V. Lebedev, N. F. Loureiro, A. Ciardi, J. Chittenden, T. Clayson, S. J. Eardley, C. Garcia, J. W. D. Halliday, T. Robinson, R. A. Smith, N. Stuart, F. Suzuki-Vidal, and E. R. Tubman. "An Experimental Platform for Pulsed-Power Driven Magnetic Reconnection". *Physics of Plasmas* 25, p. 055703. DOI: 10.1063/1.5016280.

16. 2018 L. G. Suttle, **J. D. Hare**, S. V. Lebedev, A. Ciardi, N. F. Loureiro, G. C. Burdiak, J. P. Chittenden, T. Clayson, J. W. D. Halliday, N. Niasse, D. Russell, F. Suzuki-Vidal, E. Tubman, T. Lane, J. Ma, T. Robinson, R. A. Smith, and N. Stuart. "Ion Heating and Magnetic Flux Pile-up in a Magnetic Reconnection Experiment with Super-Alfvénic Plasma Inflows". *Physics of Plasmas* 25, p. 042108. DOI: 10.1063/1.5023664.

15. 2018 T. Clayson, S. V. Lebedev, F. Suzuki-Vidal, G. C. Burdiak, J. W. D. Halliday, **J. D. Hare**, J. Ma, L. G. Suttle, and E. R. Tubman. "Inverse Liner Z-Pinch: An Experimental Pulsed Power Platform for Studying Radiative Shocks". *IEEE Transactions on Plasma Science* 46.11, pp. 3734–3740. DOI: 10.1109/TPS.2018.2868757.

14. 2017 **J. D. Hare**, S. V. Lebedev, L. G. Suttle, N. F. Loureiro, A. Ciardi, G. C. Burdiak, J. P. Chittenden, T. Clayson, S. J. Eardley, C. Garcia, J. W. D. Halliday, N. Niasse, T. Robinson, R. A. Smith, N. Stuart, F. Suzuki-Vidal, G. F. Swadling, J. Ma, and J. Wu. "Formation and Structure of a Current Sheet in Pulsed-Power Driven Magnetic Reconnection Experiments". *Physics of Plasmas* 24, p. 102703. DOI: 10.1063/1.4986012.

13. 2017 **J. D. Hare**, L. Suttle, S. V. Lebedev, N. F. Loureiro, A. Ciardi, G. C. Burdiak, J. P. Chittenden, T. Clayson, C. Garcia, N. Niasse, T. Robinson, R. A. Smith, N. Stuart, G. F. Swadling, J. Ma, J. Wu, and Q. Yang. "Anomalous Heating and Plasmoid Formation in a Driven Magnetic Reconnection Experiment". *Physical Review Letters* 118, p. 085001. DOI: 10.1103/PhysRevLett.118.085001.

12. 2017 G. C. Burdiak, S. V. Lebedev, S. N. Bland, T. Clayson, **J. Hare**, L. Suttle, D. C. Garcia, J. P. Chittenden, A. Frank, and T. S. Lane. "The Structure of Bow Shocks Formed by the Interaction of Pulsed-Power Driven Magnetised Plasma Flows with Conducting Obstacles". *Physics of Plasmas* 24, p. 072713. DOI: 10.1063/1.4993187.

11. 2016 L. G. Suttle, **J. D. Hare**, S. V. Lebedev, G. F. Swadling, G. C. Burdiak, A. Ciardi, J. P. Chittenden, N. F. Loureiro, N. Niasse, F. Suzuki-Vidal, J. Wu, Q. Yang, T. Clayson, A. Frank, T. S. Robinson, R. A. Smith, and N. Stuart. "Structure of a Magnetic Flux Annihilation Layer Formed by the Collision of Supersonic, Magnetized Plasma Flows". *Physical Review Letters* 116.22, p. 225001. DOI: 10.1103/PhysRevLett.116.225001.

10. 2016 G. F. Swadling, S. V. Lebedev, G. N. Hall, F. Suzuki-Vidal, G. C. Burdiak, L. Pickworth, P. De Grouchy, J. Skidmore, E. Khoory, L. Suttle, M. Bennett, **J. D. Hare**, T. Clayson, S. N. Bland, R. A. Smith, N. H. Stuart, S. Patankar, T. S. Robinson, A. J. Harvey-Thompson, W. Rozmus, J. Yuan, and L. Sheng. "Experimental Investigations of Ablation Stream Interaction Dynamics in Tungsten Wire Arrays: Interpenetration, Magnetic Field Advection, and Ion Deflection". *Physics of Plasmas* 23, p. 056309. DOI: 10.1063/1.4948279.

9. 2016 G. Haerendel, L. Suttle, S. V. Lebedev, G. F. Swadling, **J. D. Hare**, G. C. Burdiak, S. N. Bland, J. P. Chittenden, N. Kalmoni, A. Frank, R. A. Smith, and F. Suzuki-Vidal. "Stop Layer: A Flow Braking Mechanism in Space and Support from a Lab Experiment". *Plasma Physics and Controlled Fusion* 58, p. 064001. DOI: 10.1088/0741-3335/58/6/064001.

8. 2015 G. C. Burdiak, S. V. Lebedev, F. Suzuki-Vidal, G. F. Swadling, S. N. Bland, N. Niasse, L. Suttle, M. Bennet, **J. Hare**, M. Weinwurm, R. Rodriguez, J. Gil, and G. Espinosa. "Cylindrical Liner Z-pinch Experiments for Fusion Research and High-Energy-Density Physics". *Journal of Plasma Physics* 81, pp. 1–20. DOI: 10.1017/S0022377815000318.

7. 2015 M. Bennett, S. Lebedev, G. Hall, L. Suttle, G. Burdiak, F. Suzuki-Vidal, **J. Hare**, G. Swadling, S. Patankar, M. Bocchi, J. Chittenden, R. Smith, A. Frank, E. Blackman, R. Drake, and A. Ciardi. "Formation of Radiatively Cooled, Supersonically Rotating, Plasma Flows in Z-pinch Experiments: Towards the Development of an Experimental Platform to Study Accretion Disk Physics in the Laboratory". *High Energy Density Physics* 17, pp. 63–67. DOI: 10.1016/j.hedp.2015.02.001.

6. 2014 G. F. Swadling, S. V. Lebedev, G. N. Hall, S. Patankar, N. H. Stewart, R. A. Smith, A. J. Harvey-Thompson, G. C. Burdiak, P. de Grouchy, J. Skidmore, L. Suttle, F. Suzuki-Vidal, S. N. Bland, K. H. Kwek, L. Pickworth, M. Bennett, **J. D. Hare**, W. Rozmus, and J. Yuan. "Diagnosing Collisions of Magnetized, High Energy Density Plasma Flows Using a Combination of Collective Thomson Scattering, Faraday Rotation, and Interferometry". *Review of Scientific Instruments* 85, 11E502. DOI: 10.1063/1.4890564.

5. 2014 S. V. Lebedev, L. Suttle, G. F. Swadling, M. Bennett, S. N. Bland, G. C. Burdiak, A. Ciardi, A. Clemens, P. D. Grouchy, G. N. Hall, **J. D. Hare**, N. Kalmoni, N. Niasse, S. Patankar, L. Sheng, A. Smith, J. Yuan, A. Frank, E. G. Blackman, and R. P. Drake. "The Formation of Reverse Shocks in Magnetized High Energy Density Supersonic Plasma Flows". *Physics of Plasmas* 21, p. 056305. DOI: 10.1063/1.4874334.

4. 2014 M. J. Bennett, S. V. Lebedev, G. N. Hall, L. Suttle, G. Burdiak, F. Suzuki-Vidal, **J. Hare**, G. Swadling, S. Patankar, M. Bocchi, J. P. Chittenden, R. Smith, A. Frank, E. Blackman, R. P. Drake, and A. Ciardi. "Rotating Plasma Disks in Dense Z-pinch Experiments". *AIP Conference Proceedings* 1639, pp. 71–75. DOI: 10.1063/1.4904780.

3. 2013 J. Schmitt, T. Abrams, L. Baylor, L. Berzak Hopkins, T. Biewer, D. Bohler, D. Boyle, E. Granstedt, T. Gray, **J. Hare**, C. Jacobson, M. Jaworski, R. Kaita, T. Kozub, B. LeBlanc, D. Lundberg, M. Lucia, R. Maingi, R. Majeski, E. Merino, A. Ryou, E. Shi, J. Squire, D. Stotler, C. Thomas, K. Tritz, and L. Zakharov. "Results and Future Plans of the Lithium Tokamak eXperiment (LTX)". *Journal of Nuclear Materials* 438, S1096–S1099. DOI: 10.1016/j.jnucmat.2013.01.241.

2. 2013 R. Majeski, T. Abrams, D. Boyle, E. Granstedt, **J. Hare**, C. M. Jacobson, R. Kaita, T. Kozub, B. LeBlanc, D. P. Lundberg, M. Lucia, E. Merino, J. Schmitt, D. Stotler, T. M. Biewer, J. M. Canik, T. K. Gray, R. Maingi, A. G. McLean, S. Kubota, W. A. Peebles, P. Beiersdorfer, J. H. T. Clementson, and K. Tritz. "Particle Control and Plasma Performance in the Lithium Tokamak eXperiment". *Physics of Plasmas* 20, p. 056103. DOI: 10.1063/1.4802195.

1. 2011 Y. Alaverdyan, N. Vamivakas, J. Barnes, C. Lebouteiller, **J. Hare**, and M. Atatüre. "Spectral Tunability of a Plasmonic Antenna with a Dielectric Nanocrystal". *Optics Express* 19.19, pp. 18175–18181.