Jesse T. Coburn

CONTACT INFORMATION

Institute	Imperial College, London, United Kindom London, UK
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UAT	Solar Physics, Solar Wind

ACADEMIC QUALIFICATIONS

Doctoral Degree: Physics 2018-2022
Queen Mary University of London
Thesis Title: The Effective Mean-Free-Path of the Solar Wind
Supervisor: Christopher H. K. Chen & David Burgess

Bachelor of Science: Physics 2009-2013
University of New Hampshire
Departmental Merit: Honors in Physics
Institutional Merit: Cum Laude
Thesis Title: The Turbulent Energy Cascade
Supervisor: Charles W. Smith

RESEARCH EXPERIENCE

Research Associate (June 2025 - Present) Imperial College, London, UK
Supervisors: Timothy Horbury

Research Fellow (2022-June 2025) Mullard Space Science Lab., University College London, UK
Supervisors: Christopher Owen & Daniel Verscharen

Postgraduate Research Student (2018-2022) Queen Mary University of London, UK
Supervisors: Christopher Chen & David Burgess

Graduate Research Assistant (Summer 2020 & 2021) Los Alamos Nat. Lab., New Mexico, USA
Supervisors: Fan Guo & Xiangrong Fu

Research Assistant (2016-2018) University of Calabria, Rende, Italy
Supervisor: Luca Sorriso-Valvo

Research Assistant (2010-2016) University of New Hampshire, Durham, USA
Supervisor: Charles W. Smith

ADDITIONAL EXPERIENCE

National Astronomy Meeting Co-Convener (2024 - Present)
Session name: Solar wind formation, evolution and properties in the age of Solar Orbiter and Parker Solar Probe.

European Geophysical Union Co-Convener (2023 - Present)
Session name: Turbulence in space plasmas: from injection to dissipation.

Journal Referee (2018-Present)
Physical Review, The Astrophysical Journal, Astronomy & Astrophysics.

Demonstrator (2019-2021) Queen Mary University of London, UK
Mathematical Techniques 3: Linear algebra, partial differential equations and Green's function.
Electricity & Magnetism: Vector calculus and electrostatics.
Foundations of Mathematics: Function analysis and calculus.

ADDITIONAL TRAINING

International Space Science Institute (2024) Workshop Bern, Switzerland
Title: Electron Kinetic Physics: The Next Frontier in Space and Astrophysical Plasmas

International Space Science Institute (2023) Team Meeting Bern, Switzerland
Title: Heliospheric Energy Budget: From Kinetic Scales to Global Solar Wind Dynamics.

Los Alamos Space Weather Summer School (June & July 2021) Remote
Lectures included a variety of theoretical, experimental and computational topics on space weather. A research project was conducted which continued the summer 2020 graduate research assistant project (see Research Experience for more details).

Les Houches Physics School (13-24 May 2019) Les Houches, France
The multiple approaches to plasma physics from laboratory to astrophysics.

Kinetic Theory course at the University of Oxford (Autumn 2019) Oxford, United Kingdom
I completed the Master Course in Kinetic Theory taught by Alex Schekochihin.

AWARDS

Keith Runcorn Ph.D Thesis Prize (2023) London, UK
Awarded by the Royal Astronomical Society (London, UK).

Royal Astronomical Society: Travel Grant (February 2021) London, UK
Awarded by the Royal Astronomical Society (London, UK).

PUBLICATIONS

1. "Polytropic Analysis of Large-scale Compressive Fluctuations in the Solar Wind: Fluid and Kinetic Behavior", C. Ioannou, G. Nicolaou, C. J. Owen, D. Verscharen, J. T. Coburn ..., *The Astrophysical Journal*, 2025.

2. "Langmuir Wave Excitation in Solar-wind Magnetic Holes", J. Liu, D. Verscharen, J. T. Coburn ..., *The Astrophysical Journal*, 2025.

3. "Quasi-parallel Antisunward-propagating Whistler Waves Associated with the Electron Deficit in the Near-Sun Solar Wind: Particle-in-cell Simulation", A. Micera, D. Verscharen, J. T. Coburn, M. E. Innocenti, *The Astrophysical Journal*, 2025.

4. "Mixed Source Region Signatures inside Magnetic Switchback Patches Inferred by Heavy Ion Diagnostics", Y. J. Rivera, S. T. Badman, M. L. Stevens, J. M. Raines, ... , J. T. Coburn, ... ,*The Astrophysical Journal*, 2024.

5. "Connecting Solar Wind Velocity Spikes Measured by Solar Orbiter and Coronal Brightenings Observed by SDO", C. Hou, A. Rouillard, J. He, ... , J. T. Coburn, ... , *The Astrophysical Journal*, 2024.

6. "Candidates for downstream jets at interplanetary shocks", H. Heitala, D. Trotta, A. Fedeli, L. B. Wilson III, L. Vuorinen. J. T. Coburn, *Monthly Notices of the Royal Astronomical Society*, 2024.

7. "Multi-source connectivity as the driver of solar wind variability in the heliosphere", S.L. Yardley, D. H. Brooks, R. D'Amicis, C. J. Owen, D. M. Long, D. Baker, P. Démoulin, M. J. Owens, M. Lockwood, T. Mihailescu, J. T. Coburn, ..., *Nature Astronomy*, 2024.

8. "The regulation of the Solar Wind Electron Heat Flux by Wave-Particle Interactions", J.T. Coburn, D. Verscharen, C. J. Owen, M. Maksimovic, T. S. Horbury, C. H. K. Chen, F. Guo, X. Fu, J. Liu, J. B. Abraham, G. Nicolaou. M. E. Innocenti, A. Micera, V. K. Jagarlamudi, *The Astrophysical Journal*, 2024.

9. "A Measurement of the Effective Mean Free Path of Solar Wind Protons", J.T. Coburn, C. H. K. Chen, J. Squire, *Journal of Plasma Physics*, 2022.

10. "Energy Transfer in Incompressible Magnetohydrodynamics: The Filtered Approach", J.T. Coburn, L. Sorriso-Valvo, *Fluids*, 2019.

11. "Turbulence-driven ion beams in the magnetospheric Kelvin-Helmholtz instability", L. Sorriso-Valvo, F. Catapano, A. Retinò, O. Le Contel, D. Perrone, O. W. Roberts, J. T. Coburn ..., *Physical Review Letters*, 2019.

12. "The Turbulent Cascade for High Cross-helicity States at 1 A.U. II. Minor Energy", C. W. Smith, B. J. Vasquez, J. T. Coburn, M. A. Forman, and J. E. Stawarz, *The Astrophysical Journal*, 2018.

13. "Correlation Scales of the Turbulent Cascade at 1 AU", C. W. Smith, B. J. Vasquez, J. T. Coburn, M. A. Forman, and J. E. Stawarz, *The Astrophysical Journal*, 2018.

14. "Third-Moment Descriptions of the Interplanetary Turbulent Cascade, Intermittency, and Back Transfer", J. T. Coburn, M. A. Forman, C. W. Smith, B. J. Vasquez and J. E. Stawarz, *Philosophical Transactions Royal Society A*, 2015.

15. "Variable Cascade Dynamics and Intermittency in the Solar Wind at 1 AU", J. T. Coburn, C. W. Smith, B. J. Vasquez, M. A. Forman, and J. E. Stawarz, *The Astrophysical Journal*, 2014.

16. "The Turbulent Cascade and Proton Heating in the Solar Wind During Solar Minimum", J. T. Coburn, C. W. Smith, B. J. Vasquez, J. E. Stawarz, and M. A. Forman, *The Astrophysical Journal*, 2012.

CONFERENCE PROCEEDINGS

1. "Third-Moment Descriptions of the Interplanetary Turbulent Cascade, Intermittency, and Back Transfer", B. J. Vasquez, J. T. Coburn, M. A. Forman, C. W. Smith, and J. E. Stawarz, *Solar Heliospheric and INterplanetary Environment (SHINE 2017)*, Saint-Sauveur, QC, Canada, 2017.

2. "Solar wind turbulence cascade from third moments: intermittency and variability", M. A. Forman, J. T. Coburn, C. W. Smith, B. J. Vasquez, and J. E. Stawarz, *American Geophysical Union, Fall General Assembly*, 2016.

3. "Third Moment Description of the Turbulent Cascade and Intermittency", J. T. Coburn, C. W. Smith, M. A. Forman, B. J. Vasquez, and J. E. Stawarz, *Solar Heliospheric and INterplanetary Environment (SHINE 2016)*, Stowe, VT, USA, 2015.

4. "The Tubulent Cascade and Intemittency", C. W. Smith and J. T. Coburn, *Solar Heliospheric and INterplanetary Environment (SHINE 2016)*, Stowe, VT, USA, 2015.

5. "Turbulence cascades in the solar wind", M. A. Forman, J. T. Coburn, C. W. Smith, B. J. Vasquez, and J. E. Stawarz, *APS April Meeting*, Denver, Colorado, USA, 2014.

CONFERENCES

1. *Statistical mechanics of the electrons in the solar wind: stability and instability of whistler waves in the inner heliosphere*, D. Verscharen, A. Micera, M. E. Innocenti, J. T. Coburn, E. Boella, V. Pierrard, J. Liu, C. J. Owen, G. Nicolaou, K. G. Klein, EGU, April 2024.

2. *Simulations of Langmuir-wave emission by magnetic holes in the solar wind*, J. Liu, D. Verscharen, J. T. Coburn, J. Agudelo, K. Germaschewski, H. Reid, G. Nicolaou, C. J. Owen, EGU, April 2024.

3. *Identifying the Origins of Magnetic Field Reversals: in-situ Measurements from Solar Orbiter and Connection to Remote-sensing Observations from SDO*, J. T. Coburn, S. Yardley, R. Dewey, N. Ngampoopun, G. Suen, D. Verscharen, C. J. Owen, D. Trotta, G. Nicolaou, Y. Rivera, S. Livi, S. Lepri, J. Raines, R. De Marco, C. Ioannou, EGU, April 2024.

4. *Downstream Jets at Interplanetary Shocks: First Observations and Comparison with the Magnetosheath*, H. Hietala, D. Trotta, A. Fedeli, L. B. Wilson III, L. Vuorinen, A. T. LaMoury and J. T. Coburn, EGU, April 2024.

5. *Modelling Near-Sun Solar wind Electron Distribution Functions*, A. Micera, D. Verscharen, J. T. Coburn, J. Halekas, and M. E. Innocenti, EGU, April 2023.

6. *Downstream Jets at Interplanetary Shocks*, H. Hietala, D. Trotta, A. Fedeli, L. B. Wilson III, L. Vuorinen, and J. T. Coburn, AGU, December 2023.

7. *Measurement of the rate of change of the electron heat flux due to the whistler instability with Solar Orbiter observations*, J. T. Coburn, D. Verscharen, T. Horbury, M. Maskimovic, C. H. K Chen, F. Guo, and X. Fu, Solar Wind 16, Monterey, California USA, June 2023.

8. *Measurement of the rate of change of the electron heat flux due to the whistler instability with Solar Orbiter observations*, J. T. Coburn, D. Verscharen, T. Horbury, M. Maskimovic, C. H. K Chen, F. Guo, and X. Fu, European Geophysical Union, Vienna, Austria, April 2023.

9. *A Measurement of the effective mean-free-path of solar wind protons*, J. T. Coburn, C. H. K Chen, and J. Squire, Royal Astronomical Society: Turbulent dissipation in space plasmas, Nottingham, UK, May 2022.

10. *Measurement of the effective mean-free-path of solar wind protons*, J. T. Coburn, C. H. K Chen, and J. Squire, Fall American Geophysical Union, New Orleans, United States, December 2021.

11. *Measurement of the effective mean-free-path of solar wind protons*, J. T. Coburn, C. H. K Chen, and J. Squire, Autumn MIST Meeting, London, United Kingdom, November 2021.

12. *Measurement of the effective mean-free-path of solar wind protons*, J. T. Coburn, C. H. K Chen, and J. Squire, Arcetri Workshop, Florence, Italy, November 2021.

13. *Measurement of the effective mean-free-path of solar wind protons*, J. T. Coburn, C. H. K Chen, and J. Squire, National Astronomy Meeting, Bath, United Kingdom, July 2021.

14. *Measurement of the effective mean-free-path of solar wind protons*, J. T. Coburn, C. H. K Chen, and J. Squire, European Geophysical Union (Invited), Vienna, Austria, April 2021.

15. *Measuring quasilinear heating and particle acceleration of plasma with simulations*, J. T. Coburn, F. Guo, and X. Fu, Center for Space and Earth Science: Space Science Symposium, Remote, October 5, 2020.

16. *Generation of pressure anisotropy in a turbulent and collisionless plasma*, J.T. Coburn, C. H. K. Chen and Jonathan Squire, Autumn Magnetosphere, Ionosphere and Solar-Terrestrial Conference, Royal Astronomical Society, London, UK, January 24, 2020.

17. *Turbulent Generation of Pressure Anisotropy in the Solar Wind*, J. T. Coburn and C. H .K. Chen, Les Houches Summer School, Les Houches, France, May 2019.

18. *Third-Moment Descriptions of the Interplanetary Turbulent Cascade, Intermittency, and Back Transfer*, J. T. Coburn, M. A. Forman, C. W. Smith, B. J. Vasquez and J. E. Stawarz, SHINE Workshop, Stowe, Vermont, July 2015.

19. *Local Fluctuations and Correlations in Turbulent Cascade Rates in the Solar Wind*, M. A. Forman, J. T. Coburn, C. W. Smith, B. J. Vasquez and J. E. Stawarz (presented by M. A. Forman), Joint Assembly, Montreal, Canada, May 2015.

20. *Variable Cascade Dynamics and Intermittency in the Solar Wind at 1 AU*, B. J. Vasquez, J. T. Coburn, C. W. Smith, M. A. Forman, and J. E. Stawarz (presented by C. W. Smith), Fall Meeting of the American Geophysical Union, San Francisco, California, December 2014.

21. *Turbulence Cascades in the Solar Wind*, M. A. Forman, J. T. Coburn, C. W. Smith, B. J. Vasquez, and J. E. Stawarz (presented by M. A. Forman), Meeting of the American Physical Society, Savannah, Georgia, April 2014.

22. *Variable Cascade Dynamics and Intermittency in the Solar Wind at 1 AU*, J. T. Coburn, C. W. Smith, B. J. Vasquez, J. E. Stawarz, and M. A. Forman, Meeting on Solar Wind Turbulence, Kennebunkport, Maine, June 2013

23. *Interplanetary Turbulence During the Protracted Solar Minimum*, C. W. Smith, J. T. Coburn, B. J. Vasquez, J. E. Stawarz, and M. A. Forman (presented by C. W. Smith), AGU Chapman Conference on the Causes and Consequences of the Extended Solar Minimum Between Solar Cycles 23 and 24, Key Largo, Florida, April 2013.

24. *The Turbulent Cascade and Proton Heating in the Solar Wind During Solar Minimum*, J. T. Coburn, C. W. Smith, B. J. Vasquez, J. E. Stawarz, and M. A. Forman, Solar Wind 13, Kailua-Kona, Hawaii, June 2012.

25. *The Turbulent Cascade and Proton Heating in the Solar Wind*, J. T. Coburn, C. W. Smith, B. J. Vasquez, J. E. Stawarz, and M. A. Forman, University of New Hampshire: Undergraduate Research Conference, Durham, New Hampshire, April 2012.

26. *The Turbulent Cascade and Proton Heating in the Solar Wind During Solar Minimum*, J. T. Coburn, C. W. Smith, B. J. Vasquez, J. E. Stawarz, and M. A. Forman, SHINE Workshop, Maui, Hawaii, June 2012.

27. *The Turbulent Cascade and Proton Heating in the Solar Wind During Solar Minimum*, J. T. Coburn, C. W. Smith, B. J. Vasquez, J. E. Stawarz, and M. A. Forman, University of New Hampshire: Undergraduate Research Conference, Durham, New Hampshire, April 2012.