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EDUCATION

University of California — Los Angeles, California
Ph.D., Physics — October 2004
Galactic Dynamics with Magnetic Fields
Committee: Steven Cowley, Ferdinand Coroniti, James McWilliams, Mark Morris
Areas of Specialization: **Plasma Physics, Astrophysics, Computational Physics**

University of California — Los Angeles, California
M.S., Physics — December 1998

Victoria University of Wellington — Wellington, New Zealand
Dip. App. Sci., Geophysics — November 1995

California Institute of Technology — Pasadena, California
B.S., Applied Physics — June 1994

Occidental College — Los Angeles, California
B.A., 3/2 Combined Plan Program in Physics and Liberal Arts — June 1994

RESEARCH

Department of Physics and Astronomy, University of Iowa — 2008–present
Assistant Professor

- Nonlinear gyrokinetic simulations of kinetic astrophysical turbulence, with application to the solar wind, accretion disks around compact objects, and the interstellar medium.
- Analytical models of the turbulent cascade in kinetic plasmas and of the thermodynamics of the plasma species in the solar corona and solar wind.
- Analysis of *in situ* measurements of the turbulence in the solar wind aimed at understanding its heating and acceleration.
- Numerical modeling for the design and interpretation of basic laboratory experiments on plasma turbulence at the Large Plasma Device (LAPD) at UCLA.

Department of Astronomy, UC Berkeley — 2004–2008
Visiting Assistant Professional Research Astronomer
Mentor: Professor Eliot Quataert
Collaborators: S. D. Bale (Berkeley), S. C. Cowley (UCLA), W. Dorland (Maryland), G. W. Hammett (Princeton), A. A. Schekochihin (Imperial)

- Nonlinear gyrokinetic simulations of kinetic astrophysical turbulence, with application to the solar wind, accretion disks around compact objects, and the interstellar medium.
- Analytical models of the turbulent cascade in kinetic plasmas and of the thermodynamics of the plasma species in the solar corona and solar wind.
- Analysis of *in situ* measurements of the turbulence in the solar wind aimed at understanding its heating and acceleration.

Plasma Theory Group, Department of Physics, UCLA 1999–2004
Graduate Student
Advisor: Professor Steven C. Cowley

- Development of Gradient Particle Magnetohydrodynamics (GPM), a new algorithm for Lagrangian MHD simulation.
- Development of a high-performace, parallel GPM code for the investigation of the origin and evolution of the Galactic magnetic field.
- An analytical and numerical investigation of gravitational stability of a plasma in the presence of magnetic shear and shear flow.

TEACHING

Department of Physics, Occidental College Fall 2000
Adjunct Instructor

- Physics 105–Light: An introductory course on optics, waves, relativity, and quantum mechanics.
- Physics 105–Light Laboratory: Standard optics laboratory experiments.

Department of Physics, Occidental College 1996–1997
Adjunct Instructor

- Physics 110–Mechanics: An introductory course on classical mechanics.
- Physics 110–Mechanics Laboratory: Experiments on classical mechanics.
- Physics 140–Light and Modern Physics Laboratory: Experiments on optics, waves, and nuclear physics.

HONORS

- University of Iowa Old Gold Fellowship Award, 2009.
- UCLA Graduate Division Dissertation Year Fellowship, 2001-2002.
- Department of Energy Fusion Energy Sciences Fellowship, 1997-2000.
- UCLA Physics Division Fellowship, 1997-2001.
- Institute of Geophysics and Planetary Physics Fellowship, 1997-1999.
- Rotary Ambassadorial Scholarship to New Zealand, 1995.
- National Undergraduate Fellowship in Plasma Physics and Fusion Engineering, 1993.
- Phi Beta Kappa, National Honor Society, 1992.
- Sigma Pi Sigma, National Physics Honor Society, 1992.
- Charles W. List (Male Freshman of the Year) Award, 1990.

INVITED TALKS

Kinetic Turbulence in Weakly Collisional Plasmas
17th Cluster Workshop, Uppsala, Sweden, 12–15 May 2009.

Kinetic Dissipation of Solar Wind Turbulence
DPG Spring Meeting, Griefswald, Germany, 30 March–2 April 2009.

Kinetic Dissipation of Astrophysical Turbulence
Seventh International Workshop on Nonlinear Waves and Turbulence in Space Plasmas, Beaulieu, France, 20–24 Apr 2008.

Turbulence in the Solar Wind: Theory, Simulations, and Comparisons with Observations
Division of Plasma Physics, American Physical Society, Orlando, FL, 12–16 Nov 2007.

Particle Heating through the Dissipation of Magnetized Turbulence: Theory, Simulations, and Implications for Coronal Heating
SHINE 2007 Workshop, Whistler, BC, Canada, 30 Jul–3 Aug 2007.

Turbulence in Magnetized Plasmas: Implications for Dissipation-Scale Turbulence in the Solar Wind
Turbulence in Diffuse Astrophysical Environments Session, 210th American Astronomical Society Meeting, Honolulu, HI, 27–31 May 2007.

Critically Balanced Turbulence in Magnetized Plasmas: Implications for Dissipation-Scale Turbulence in the Solar Wind
IGPP 6th Annual International Astrophysics Conference: Turbulence and Nonlinear Processes in Astrophysical Plasmas, Honolulu, HI, 16–22 Mar 2007.

Critically Balanced Turbulence in Magnetized Plasmas: Implications for Dissipation-Scale Turbulence in the Solar Wind
Space Physics Seminar, University of California, Berkeley, CA, 13 Mar 2007.

Gradient Particle Magnetohydrodynamics and Adaptive Particle Refinement
Grand Challenge Problems in Computational Astrophysics, Astrophysical Fluid Dynamics Workshop, Institute for Pure and Applied Mathematics, UCLA, Los Angeles, CA 4–9 Apr 2005.

REFERENCES

Professor Steven C. Cowley Ph.D. thesis advisor	e-mail: cowley@physics.ucla.edu Phone: (310) 825-1381
Professor William Dorland Colleague	e-mail: bdorland@umd.edu Phone: (301) 405-1647, -1608
Professor Eliot Quataert Postdoctoral mentor	e-mail: eliot@astro.berkeley.edu Phone: (510) 642-3792
Professor George Schmiedeshoff Teaching reference (letter not requested)	e-mail: gms@oxy.edu Phone: (323) 259-2800

PEER-REVIEWED PUBLICATIONS

Numerical Modeling of LAPD Alfven Wave Experiments using AstroGK
Nielson, K. D. and Howes, G. G.
Phys. Plasmas, submitted 2009.

Constraining low-frequnecy Alfvenic turbulence in the solar wind using density-fluctuation measurements
Chandran, B. D. G., Quataert, E., Howes, G. G., Xia, Q., and Pongkitiwanichakul, P.
Astrophys. J., submitted 2009.

On the Interpretation of Magnetic Helicity Signatures in the Dissipation Range of Solar Wind Turbulence
Howes, G. G. and Quataert, E.
Astrophys. J.. Lett., in press 2009.

Magnetic fluctuation power near proton temperature anisotropy instability thresholds in the solar wind
Bale, S. D., Kasper, J. C., Howes, G. G., Quataert, E., Salem, C., and Sundkvist, D.
Phys. Rev. Lett., in press 2009.

Steep, Transient Density Gradients in the Martian Ionopshere Similar to the Ionopause at Venus
Duru, F., Gurnett, D. A. , Frahm, R. A., Winningham, J. D., Morgan, D. D., and Howes, G. G.
J. Geophys. Res., in press 2009.

Nonlinear phase mixing and phase-space cascade of entropy in gyrokinetic plasma turbulence
Tatsuno, T., Dorland, W., Schekochihin, A. A., Plunk, G., Barnes, M. A., Cowley, S. C., and Howes, G. G.
Phys. Rev. Lett. **103**, 015003 (2009).

The Turbulent Heating Rate in Strong MHD Turbulence with Nonzero Cross Helicity
Chandran, B. D. G., Dorland, W., Hollweg, J., Howes, G. G., and Quataert, E.
Astrophys. J., **701**, 652 (2009).

Kinetic and Fluid Turbulent Cascades in Magnetized Weakly Collisional Astrophysical Plasmas
Schekochihin, A. A., Cowley, S. C., Dorland, W., Hammett, G. W., Howes, G. G., Quataert, E., and Tatsuno, T.
Astrophys. J. Supp., **182**, 310–377 (2009).

Limitations of Hall MHD as a model for turbulence in weakly collisional plasmas
Howes, G. G.
Nonlin. Processes Geophys., **16**, 219–232 (2009).

Gyrokinetic turbulence: a nonlinear route to dissipation through phase space
Schekochihin, A. A., Cowley, S. C., Dorland, W., Hammett, G. W., Howes, G. G., Plunk, G. G., Quataert, E., and Tatsuno, T.
Plasma Phys. Control. Fusion, **50**, 124024 (2008).

Howes et al. Reply to Comment on "Kinetic Simulations of Magnetized Turbulence in Astrophysical Plasmas"
Howes, G. G., Cowley, S. C., Dorland, W., Hammett, G. W., Quataert, E., Schekochihin, A. A., and Tatsuno, T.
Phys. Rev. Lett. **101**, 149502 (2008).

Kinetic Simulations of Magnetized Turbulence in Astrophysical Plasmas
Howes, G. G., Cowley, S. C., Dorland, W., Hammett, G. W., Quataert, E., Schekochihin, A. A., and Tatsuno, T.
Phys. Rev. Lett. **100**, 065004 (2008).

Inertial Range Turbulence in Kinetic Plasmas
Howes, G. G.
Phys. Plasmas **15**, 055904 (2008).

A Model of Turbulence in Magnetized Plasmas: Implications for the Dissipation Range in the Solar Wind
Howes, G. G., Cowley, S. C., Dorland, W., Hammett, G. W., Quataert, E., and Schekochihin, A. A.
J. Geophys. Res. **113**, A05103 (2008).

Dissipation-scale turbulence in the solar wind
Howes, G. G., Cowley, S. C., Dorland, W., Hammett, G. W., Quataert, E., and Schekochihin, A. A.
in Turbulence and Nonlinear Processes in Astrophysical Plasmas, AIP Conf. Proc. **932**, 3–8 (2007).

Astrophysical Gyrokinetics: Basic Equations and Linear Theory
Howes, G. G., Cowley, S. C., Dorland, W., Hammett, G. W., Quataert, E., and Schekochihin, A. A.
Astrophys. J. **651**, 590–614 (2006).

Gradient Particle Magnetohydrodynamics
Maron, J. L. and Howes, G. G.
Astrophys. J. **595**,564–572 (2003).

Local Buoyant Instability of Magnetized Shear Flows
Howes, G. G., Cowley, S. C., and McWilliams, J. C.
Astrophys. J. **560**, 617–629 (2001).

Measured constraints on the suprathermal electron temperature anisotropy in the solar wind
Bale, S. D., Xu, K., Salem, C,. Kasper, J. C., Howes, G. G., and Quataert, E.
Phys. Rev. Lett., in preparation 2008.

AstroGK: Astrophysical Gyrokinetics Code
Howes, G. G., Tatsuno, T., and Dorland, W.
J. Comp. Phys., in preparation 2008.

Driving and Dissipation in Kinetic Simulations of Magnetized Turbulence
Howes, G. G., Cowley, S. C., and Dorland, W.
Comp. Phys. Comm., in preparation 2008.