

Ian Abel

Plasma Theory Research Group
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Personal Information

Born on February 19, 1985.

British Citizen

Education

Oxford University & Culham Centre for Fusion Energy, 2007–2013
Doctor of Philosophy, Advisors: Dr A. A. Schekochihin & Dr S. E. Sharapov
Title: *Multiscale Gyrokinetics for Rotating Tokamak Plasmas*

Cambridge University, Dept. Applied Maths and Theoretical Physics, 2006–2007
Certificate of Advanced Study in Mathematics / Masters in Mathematics (MMath), Distinction

Cambridge University, Trinity Hall, 2003–2006
B.A. Mathematics, 1st Class Honours

Research Interests

Kinetic plasma turbulence; Gyrokinetics; multiscale approaches

Edge Physics; ELMs

Energetic particle physics; Alfvén eigenmodes; Physics of Burning Plasmas

Advanced algorithms; Adjoint methods; Control of Partial Differential Equations

Positions Held

Oct 2018 to date: Visiting Assistant Research Scientist, University of Maryland, College Park

Jan 2017 – Sep 2018: Researcher, Chalmers University of Technology, Gothenburg

Sep 2013 – Aug 2016: Postdoctoral Fellowship, Princeton Centre for Theoretical Science, Princeton

Sep 2010 – Aug 2013: Culham Junior Research Fellowship in Physics, Merton College, Oxford

Publications

Journal Articles

E J Paul, I G Abel, M Landreman, W Dorland

An adjoint method for neoclassical stellarator optimization

Submitted to *J. Plasma Phys.* <http://arxiv.org/abs/1904.06430>

I G Abel, A Hallenbert

Multiscale Modelling for Tokamak Pedestals

J. Plasma Phys. (2018), Vol. 84, 745840202

M W Kunz, I G Abel, K G Klein, A A Schekochihin

Astrophysical gyrokinetics: Turbulence in pressure-anisotropic plasmas at ion scales and beyond

J. Plasma Phys. (2018), vol. 84, 715840201

G J Wilkie, A Iatchenko, I G Abel, E G Highcock, I Pusztai, and JET Contributors

First principles of modelling the stabilization of microturbulence by fast ions

Nuclear Fusion, Vol. 58 (2018), 082024

G J Wilkie, I Pusztai, I G Abel, W Dorland, T Fülöp

Global anomalous transport of ICRH- and NBI-heated fast ions *Plasma Physics and Controlled Fusion*,

Vol. 59 (2017), 044007

G J Wilkie, I G Abel, M Landreman, W Dorland

Transport and deceleration of fusion products in microturbulence

Physics of Plasmas, Vol. 23 (2016), 060703

G. Wilkie, I. G. Abel, E. Highcock, W. Dorland

Validating modelling assumptions of alpha particles in electrostatic turbulence

Journal of Plasma Physics, Vol. 81 (2015), 905810306

M. W. Kunz, C. H. K. Chen, A. A. Schekochihin, I. G. Abel, S. C. Cowley

Inertial-Range Kinetic Turbulence in Collisionless Magnetized Astrophysical Plasmas

Journal of Plasma Physics, Vol. 81 (2015), 325810501

I G Abel, G G Plunk, E Wang, M A Barnes, S C Cowley, W Dorland, A A Schekochihin

Multiscale Gyrokinetics for Rotating Tokamak Plasmas: Fluctuations, Transport and Energy Flows

Reports on Progress in Physics, Vol. 76 (2013) 116201

I G Abel, S C Cowley

Multiscale Gyrokinetics for Rotating Tokamaks II: Reduced Models for Electron Dynamics

New Journal of Physics, Vol 15. (2013) 023041

Y.-c. Ghim, A. A. Schekochihin, A. R. Field, I. G. Abel, M. Barnes, G. Colyer, S. C. Cowley, F. I. Parra, D. Dunai, S. Zoletnik and the MAST Team

Experimental Signatures of Critically Balanced Turbulence in MAST

Physical Review Letters, Vol. 110 (2013) 145002

C M Roach, I G Abel, R J Akers, W Arter, M Barnes, Y Camenen, F J Casson, G Colyer, J W Connor, S C Cowley, D Dickinson, W Dorland, A R Field, W Guttenfelder, G W Hammett, R J Hastie, E Highcock, N F Loureiro, A G Peeters, M Reshko, S Saarelma, A A Schekochihin, M Valovic and H R Wilson

Gyrokinetic Simulations of Spherical Tokamaks

Plasma Physics and Controlled Fusion, Vol. 51 (2009) 124020

I G Abel, B N Breizman, S E Sharapov
Resonant Excitation of Shear Alfvén Perturbations by Trapped Energetic Ions in a Tokamak
Physics Of Plasmas Vol. 16 (2009), 102506

M A Barnes, I G Abel, S C Cowley, W Dorland, D R Ernst, G W Hammett, P Ricci, B N Rogers
 A A Schekochihin, T Tatsuno
Linearized model Fokker-Planck collision operators for gyrokinetic simulations II: Numerical implementation and tests
Physics Of Plasmas Vol. 16 (2009), 072107

M. Barnes, I. G. Abel, W. Dorland, T. Görler, G. W. Hammett, F. Jenko
Direct multiscale coupling of a transport code to gyrokinetic turbulence codes
Physics Of Plasmas, Vol. 17 (2009) 056109

I G Abel, M A Barnes, S C Cowley, W Dorland and A A Schekochihin
Linearized model Fokker-Planck collision operators for gyrokinetic simulations I: Theory
Physics Of Plasmas Vol. 15 (2008), 122509

H Meyer et. al.
Overview of physics results from MAST towards ITER/DEMO and the MAST Upgrade
Nuclear Fusion, Vol. 53 (2013) 104008

I G Abel, G Wilkie, A A Schekochihin
Multiscale Gyrokinetics for Rotating Tokamak Plasmas III: Energetic Particles
In Preparation

Conference Proceedings

A Hakim, E L Shi, I G Abel, G W Hammett, T Stoltzfus-Dueck
Scrape-Off Layer Turbulence in Tokamaks Simulated with a Continuum Gyrokinetic Code
Proceedings of the 26th IAEA Fusion Energy Conference, Kyoto, 2016

I G Abel, M A Barnes, S C Cowley, W Dorland, G W Hammett, A A Schekochihin, T Tatsuno
Model Collision Operators for Numerical Gyrokinetics
Theory Of Fusion Plasmas: Proceedings of the Joint Varenna-Lausanne International Workshop, edited by O. Sauter (AIP, 2008), pp. 233-239

Research Supervision and Teaching

Research Students

- A. Hallenbert, M. Sc. Thesis Advisor, Chalmers University of Technology, Aug 2017 - Mar 2018
- G. Wilkie, Mentor to Ph.D student, University of Maryland College Park, 2013-2014

Presentations

Conferences/Workshops

- Presentation at Sherwood Fusion Theory Meeting in New York, Mar 2015
- G. J. Wilkie, I. G. Abel, E. G. Highcock, W. Dorland
Efficient calculation of impurity transport and an improved slowing-down distribution for alpha particles

Poster Presentation at 56th APS Division of Plasma Physics Meeting in Denver, Nov 2014
G W Hammett, A Hakim, E Shi, I G Abel, T Stoltzfus-Dueck

Gyrokinetic Magnetic Fluctuations in an ELM Heat Pulse Scrape-Off-Layer Test Problem

Poster Presentation at 56th APS Division of Plasma Physics Meeting in Denver, Nov 2014

A Hakim, G W Hammett, E Shi, I G Abel

Discontinuous Galerkin schemes for a class of Hamiltonian evolution equations with applications to gyrokinetic edge turbulence problems

Poster Presentation at 55th APS Division of Plasma Physics Meeting in Denver, Nov 2013

G Wilkie, E Highcock, I G Abel, W Dorland

Gyrokinetic simulations with a general equilibrium distribution function

Poster Presentation at 52nd APS Division of Plasma Physics Meeting in Chicago, Nov 2010

W Dorland, K Despain, M A Barnes, F I Parra, E Highcock, A A Schekochihin, I G Abel, S C Cowley

Confinement studies for novel MCF reactor configurations

Invited Talk at 4th IAEA Technical Meeting on Plasma Instabilities, Kyoto, May 2009

I G Abel, B N Breizman, S E Sharapov

Resonant Excitation of Shear Alfvén Perturbations by Trapped Energetic Ions in a Tokamak

Poster Presentation at 50th APS Division of Plasma Physics Meeting in Dallas, Nov 2008

I G Abel, B N Breizman, S E Sharapov

Resonant Excitation of Shear Alfvén Perturbations by Trapped Energetic Ions in a Tokamak

Poster Presentation at Theory of Fusion Plasmas, Varenna-Lausanne International Workshop, Aug 2008

I G Abel, M A Barnes, S C Cowley, W Dorland, G W Hammett, A A Schekochihin, T Tatsuno

Model Collision Operators for Numerical Gyrokinetics