

Curriculum Vitae

Andrew J Cole

Applied Physics and Applied Mathematics Department
Columbia University
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Field of Specialization

Theoretical plasma physics with a focus on analytic and numerical modeling to better understand the behavior of magnetically confined high temperature plasmas for nuclear fusion applications

Education and Training

Ph.D. Physics - University of Texas at Austin - May, 2006
Culham Plasma Physics Summer School - UKAEA, Oxfordshire, UK - July 2002
B.A. Physics & Applied Mathematics - University of Oregon - June, 2000

Research and Professional Experience

2018—present Associate Professor- Applied Physics and Mathematics - Columbia University
2011—2018 Assistant Professor - Applied Physics and Mathematics - Columbia University
2009—2011 Assistant Scientist - Center for Plasma Theory and Computation -
University of Wisconsin
2006—2009 Postdoctoral Research Fellow - Center for Plasma Theory and Computation -
University of Wisconsin
2001—2006 Graduate Teaching Assistant- Waves and Optics Lab
University of Texas at Austin
2000—2006 Graduate Research Assistant - Institute for Fusion Studies -
University of Texas at Austin
1998—2000 (Summers) Undergraduate Technician: Inertial Electrostatic Confinement experi-
ment - NIS-5 and T-15 - Los Alamos National Laboratory

Ph.D. Student Supervision

Dov J. Rhodes: *Shaping Effects on Magnetohydrodynamic Instabilities in a Tokamak Plasma Surrounded by a Resistive Wall*, 2017.

Synergistic Activities

Executive Committee, International Sherwood Fusion Theory Meeting, 2013–2016
Program Committee, International Sherwood Fusion Theory Meeting, 2014
Program Committee, 2010–2016, *Workshop on Active Control of MHD Stability*
Referee for Physical Review Letters, Physics of Plasmas, Nuclear Fusion, Journal of Plasma Physics, Phys. Letters A: Plasma and Fluid Physics. Grant Reviewer for DOE Fusion Energy Sciences.
2016 International Fusion Theory Conference Invited Talk, *Error field penetration and locking to the backward wave*.
2010 APS Division of Plasma Physics Invited Talk, *Peak neoclassical toroidal viscosity at low toroidal rotation in the DIII-D tokamak*.
2010 Workshop on Active Control of MHD Stability, *Neoclassical toroidal Viscosity: progress, puzzles and challenges*.
2009 Joint April APS Meeting/International Fusion Theory Conference Invited Talk, *Neoclassical toroidal viscosity induced rotation in tokamaks and quasi-symmetric stellarators*.
2007 APS Division of Plasma Physics Invited Talk, *Neoclassical toroidal viscosity and error-field penetration in tokamaks*.

Collaborators

J.D. Callen, Univ. of Wisconsin	K.H. Burrell, General Atomics
C.C. Hegna, Univ. of Wisconsin	J.S. deGrassie, General Atomics
J.M. Finn, LANL (retired), Tibbar Plasma Technologies, Los Alamos	A.M. Garofalo, General Atomics
Dylan Brennan, Princeton Univ.	H. Reimerdes, CRPP, Geneva, Switzerland
	W.M. Solomon, General Atomics

Graduate and Postdoctoral Advisors

Ph.D. supervisor: Richard Fitzpatrick, University of Texas at Austin
Postdoctoral supervisors: James Callen and Chris Hegna, University of Wisconsin

Publications

1. R. A. Nebel, A. J. Cole, M. M. Pickrell, & K. R. Umstadter. *Innovative energy sources and advanced applications: the Los Alamos Intense Neutron Source*. 18th IEEE/NPSS Symposium on Fusion Engineering. Symposium Proceedings 31 (1999). <https://ieeexplore.ieee.org/document/849786/>.
2. A. Cole, & R. Fitzpatrick. *Forced magnetic reconnection in the inviscid Taylor problem*. Phys. Plasmas **11**, 3525 (2004). <http://link.aip.org/link/doi/10.1063/1.1756587>.
3. A. Cole, & R. Fitzpatrick. *Drift-MHD theory of error-field penetration in tokamak plasmas*. Phys. Plasmas **13**, 032503 (2006). <http://link.aip.org/link/doi/10.1063/1.2178167>.
4. A.J. Cole, C.C. Hegna, & J.D. Callen. *Effect of neoclassical toroidal viscosity on error-field penetration thresholds in tokamak plasmas*. Phys. Rev. Lett. **99**, 065001 (2007). <http://link.aps.org/doi/10.1103/PhysRevLett.99.065001>.
5. A.J. Cole, C.C. Hegna, & J.D. Callen. *Neoclassical toroidal viscosity and error-field penetration in tokamaks*. Phys. Plasmas **15**, 056102 (2008). <http://link.aip.org/link/doi/10.1063/1.2838241>.
6. J.D. Callen, A.J. Cole, & C.C. Hegna. *Toroidal rotation in tokamak plasmas*. Nuc. Fusion **49**, 085021 (2009). <http://iopscience.iop.org/article/10.1088/0029-5515/49/8/085021>.
7. J.D. Callen, A.J. Cole, & C.C. Hegna. *Toroidal flow and radial particle flux in tokamak plasmas*. Phys. Plasmas **16**, 082504 (2009). <http://link.aip.org/link/doi/10.1063/1.3206976>.
8. W.M. Solomon, K.H. Burrell, A.M. Garofalo, A.J. Cole, R.V. Budny, J.S. deGrassie, W.W. Heidbrink, G.L. Jackson, M.J. Lanctot, R. Nazikian, H. Reimerdes, E.J. Strait, M.A. Van Zeeland, & the DIII-D Rotation Physics Task Force. *Advances in understanding the generation and evolution of the toroidal rotation profile on DIII-D*. Nucl. Fusion **49** 085005 (2009). <http://iopscience.iop.org/0029-5515/49/8/085005>.
9. M. Bécoulet and G. Huysmans and X. Garbet and E. Nardon and D. Howell and A. Garofalo and M. Schaffer and T. Evans and K. Shaing and A. Cole and J.-K. Park and P. Cahyna. *Physics of penetration of resonant magnetic perturbations used for Type I edge localized modes suppression in tokamaks*. Nuc. Fusion **49** 085011 (2009). <http://iopscience.iop.org/article/10.1088/0029-5515/49/8/085011/>.
10. W.M. Solomon, K.H. Burrell, A.M. Garofalo, S.M. Kaye, R.E. Bell, A.J. Cole, J.S. deGrassie, P.H. Diamond, T.S. Hahm, G.L. Jackson, M.J. Lanctot, C.C. Petty, H. Reimerdes, S.A. Sabbagh, E.J. Strait, T. Tala, and R.E. Waltz. *Mechanisms for generating toroidal rotation in tokamaks without external momentum input*. Phys. Plasmas **17**, 056108 (2010), <http://link.aip.org/link/doi/10.1063/1.3328521>.
11. J.D. Callen, C.C. Hegna, & A.J. Cole. *Transport equations in tokamak plasmas*. Phys. Plasmas **17**, 056113 (2010). <http://link.aip.org/link/doi/10.1063/1.3335486>.
12. C.C. Hegna, J.D. Callen, & A.J. Cole. *Rotation properties of tokamak plasmas*. Fus. Sci. Technology **59**, 623 (2011). <https://doi.org/10.13182/FST11-A11705>.
13. A.J. Cole, J.D. Callen, W.M. Solomon, A.M. Garofalo, C.C. Hegna, H. Reimerdes, & the DIII-D Team. *Observation of peak neoclassical toroidal viscous force in the DIII-D tokamak*. Phys. Rev. Lett. **106**, 225002 (2011). <http://link.aps.org/doi/10.1103/PhysRevLett.106.225002>.

14. A.J. Cole, J.D. Callen, W.M. Solomon, A.M. Garofalo, C.C. Hegna, H. Reimerdes, & the DIII-D Team. *Peak neoclassical toroidal viscosity at low toroidal rotation in the DIII-D tokamak*. Phys. Plasmas **18**, 055711 (2011). <http://link.aip.org/link/doi/10.1063/1.3590933>.
15. J.D. Callen, A.J. Cole, C.C. Hegna, S. Mordijck, & R.A. Moyer. *Resonant magnetic perturbation effects on pedestal structure and ELMs*. Nuc. Fusion **52**, 114005 (2012). <http://iopscience.iop.org/article/10.1088/0029-5515/52/11/114005/>.
16. J.D. Callen, A.J. Cole, & C.C. Hegna. *Resonant-magnetic-perturbation-induced plasma transport in H-mode pedestals*. Phys. Plasmas **19**, 112505 (2012). <https://doi.org/10.1063/1.4767642>.
17. J.D. Callen, A.J. Cole, & C.C. Hegna. *Toroidal flow and radial particle flux in tokamak plasmas*. Phys. Plasmas **16**, 082504 (2009). <https://doi.org/10.1063/1.3206976>.
18. J.D. Callen, C.C. Hegna, & A.J. Cole. *Magnetic-flutter-induced pedestal plasma transport*. Nuc. Fusion **53**, 113015 (2013). <http://iopscience.iop.org/article/10.1088/0029-5515/53/11/113015>.
19. A.J. Cole, & J.M. Finn, *Variational principles with Pade approximants for tearing mode analysis*. Phys. Plasmas **21**, 032508 (2014). <http://scitation.aip.org/content/aip/journal/pop/21/3/10.1063/1.4868861>.
20. A.J. Cole, J.M. Finn, C.C. Hegna, & P.W. Terry, *Forces and moments within layers of driven tearing modes with sheared rotation*. Phys. Plasmas **22**, 102514 (2015). <http://scitation.aip.org/content/aip/journal/pop/22/10/10.1063/1.4932991>.
21. John M. Finn, Andrew J. Cole & Dylan P. Brennan, *Error field penetration and locking to the backward propagating wave*. Phys. Plasmas **22**, 120701 (2015). <http://scitation.aip.org/content/aip/journal/pop/22/12/10.1063/1.4939211>.
22. J.M. Finn, A.J. Cole, & D.P. Brennan, *Real frequency tearing modes with parallel dynamics and their effect on resistive wall modes and locking*. arXiv:1708.04700 (2017). <https://arxiv.org/abs/1708.04700>.
23. Dov J. Rhodes, A. J. Cole, D. P. Brennan, J. M. Finn, M. Li, R. Fitzpatrick, M. E. Mauel, & G. A. Navratil, *Shaping effects on toroidal magnetohydrodynamic modes in the presence of plasma and wall resistivity*. Phys. Plasmas **25**, 012517 (2018). <http://aip.scitation.org/doi/full/10.1063/1.4991873>.