

CURRICULUM VITAE ————— DAVID CHRISTOPHER COLLINS

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RESEARCH INTERESTS

Computational fluid dynamics and magnetohydrodynamics
High performance computing
Compressible magnetized turbulence
Molecular cloud dynamics
Pre- and proto-stellar core formation
Formation of planetary systems
Mathematics, Physics and Astronomy Education

EMPLOYMENT

Assistant Professor, Florida State University	2013-present
Nicholas C. Metropolis Postdoctoral Fellow	2011-2013
Advisors: Hui Li, James H. Cooley	
Postdoctoral Scholar, University of California, San Diego	2009-2011
Advisor: Alexei G. Kritsuk	
Graduate Research Assistant	2002-2009
Advisors: Michael L. Norman, Paolo Padoan	
Breyer's Branches High School Tutoring	2005-2006
Teaching Assistant Coordinator, UCSD	2002-2005
Teaching Assistant, UCSD	2002-2005
Physics 1A: Mechanics	
Physics 1B: Electricity and Magnetism, Thermal Physics	
Physics 1C: Optics, Nuclear Physics, Modern Physics	

EDUCATION

University of California San Diego	PhD., Physics, 2009
Thesis: <i>Star Formation with Adaptive Mesh Refinement and Magnetohydrodynamics</i>	
Advisors: Michael L. Norman, Paolo Padoan	
University of California San Diego	M.S., Physics, 2004
University of Cincinnati	B.S., Physics, 2001
University of Cincinnati	B.A., Mathematics, 2001
Eastman School of Music	1995-1997

PUBLICATIONS

“Local Support Against Gravity in Magnetoturbulent Fluids”, Schmidt, W., Collins, D. C., Kritsuk, A. G., submitted to Monthly Notices of the Royal Astronomical Society

“Resolution Effects in Self Gravitating MHD Turbulence”, Collins, D. C., Padoan, P., Norman, M. L., Xu, H., in preparation

“Cosmological MHD Simulations of Galaxy Cluster Radio Relics: Insights and Warnings for Observations”, Skillman, S. W., Xu, H., Hallman, E. J., OShea, B. W., Burns, J., Li, H., Norman, M. L., Collins, D. C., accepted for publication in the Astrophysical Journal.

“Comparisons of Cosmological Magnetohydrodynamic Galaxy Cluster Simulations to Radio Observations”, Xu, H., Govoni, F., Murgia, M., Li, H., Collins, D. C., Norman, M. L., Cen, R., Feretti, L., Giovannini, G., Astrophysical Journal, 2012, 759, 40

“The Two States of Star Forming Clouds”, Collins, D. C., Kritsuk, A., Padoan, P., Li, H., Xu, H., Ustyugov, S., Norman, M. L., Astrophysical Journal, 2012, 750, 13

“Comparing Numerical Methods for Isothermal Magnetized Supersonic Turbulence”, Kritsuk, A., Nordlund, Å, Collins, D. C., et al., Astrophysical Journal, 2011, 737, 13

“Accuracy of Core Mass Estimates in Simulated Observations of Dust Emission”, Malinen, J., Juvela, M., Collins, D. C., Lunttila, T., Padoan, P., Astronomy & Astrophysics, 2011, 530, A101

“Mass and Magnetic Distributions in Self Gravitating Super Alfvénic Turbulence with AMR”, Collins, D. C., Padoan, P., Norman, M. L., Xu, H., Astrophysical Journal, 2011, 731, 59

“Evolution and Distribution of Magnetic Fields from Active Galactic Nuclei in Galaxy Clusters. II. The Effects of Cluster Size and Dynamical State”, Xu, H., Li, H., Collins, D. C., Li, S., Norman, M. L., Astrophysical Journal, 2011, 739, 77

“Evolution and Distribution of Magnetic Fields from AGNs in Galaxy Clusters. I. The Effect of Injection Energy and Redshift”, Xu, H., Li, H., Collins, D. C., Li, S., Norman, M. L., Astrophysical Journal, 2010, 752, 2152

“The Effect of Projection on Derived Mass-Size and Linewidth-Size Relationships”, Shetty, R., Collins, D. C., Kauffmann, J., Goodman, A. A., Rosolowsky, E. W., Norman, M. L., Astrophysical Journal, 2010, 712, 1049

“Cosmological AMR MHD with Enzo”, Collins, D. C., Xu, H., Norman, M. L., Li, H., Li, S., Astrophysical Journal Supplement, 2010, 186, 308

“Turbulence and Dynamo in Galaxy Cluster Medium: Implications on the Origin of Cluster Magnetic Fields”, Xu, H., Li, H., Collins, D. C., Li, S., Norman, M. L., Astrophysical Journal, 2009, 698, L14

“The Biermann Battery in Cosmological MHD Simulations of Population III Star Formation”, Xu, H., O’Shea, B. W., Collins, D. C., Norman, M.L., Astrophysical Journal Letters, 2008, 688, L57

“Formation of X-Ray Cavities by the Magnetically Dominated Jet-Lobe System in a Galaxy Cluster”, Xu, H., Li, H., Collins, D. C., Li, S., Norman, M. L., Astrophysical Journal Letters, 2008, 681, L61

GRANTS

2012 Institute for Geophysics and Planetary Physics “Constraining Interstellar Magnetic Fields and Their Role in Star Formation” \$64,000

2012 LANL Institutional Computing “Magnetic Fields in Star Formation” 8.25 million CPU-hours

2009 TRAC “Star Formation in Turbulent Magnetohydrodynamical Clouds using Adaptive Mesh Refinement.” 2.2 million CPU-hours

INVITED PRESENTATIONS

- “Magnetic Fields in Star Formation”, NRAO, Socorro, New Mexico, October 31, 2012
- “Turbulence, Magnetic Fields, and Self Gravity”, *Second ICM Theory and Computation Workshop*, University of Michigan, August 30, 2012
- “Taller de Enzo”, lecture series on computational physics with Enzo, Ensenada, Mexico, July 24-27, 2012
- “Intro to Enzo: What has Been Done, and What You Can Do”
 - “First Steps with Enzo”
 - “Five Minute Intro to Python”
 - “First Steps with YT”
 - “Enzo Algorithms and Computational Physics”
 - “Under the Hood: Modifying Enzo”
 - “The Two States of Star Formation”
- “The Two States of Star Forming Clouds”, University of Wisconsin, Madison, May 10, 2012
- “Super Alfvénic, Supersonic Turbulence with Self Gravity”, *Compressible Turbulence at the Intersection of Astrophysics and Engineering*, Santa Fe, NM, April 26, 2011
- “MHD in Enzo”, *Enzo User Workshop*, San Diego Supercomputer Center, June 29, 2010
- “How Enzo Starts”, *Enzo User Workshop*, San Diego Supercomputer Center, June 28, 2010
- “AMR Cosmological & Astrophysical Simulations with Enzo”, University of Helsinki, July 7, 2007

CONTRIBUTED PRESENTATIONS

- “Local support against gravity in magneto-turbulent fluids”, *The low-metallicity ISM: Chemistry, turbulence and magnetic fields*, Goettingen, Germany, October 13, 2012
- “The Two States of Star Forming Clouds”, *Turbulence in Cosmic Structure Formation*, Arizona State University, March 6, 2012
- “The Two States of Star Forming Clouds”, *Center for Magnetic Self Organization*, University of New Hampshire, October 21, 2011
- “An Introduction to Star Formation and Magnetic Fields”, *Young CMSO*, University of New Hampshire, October 17, 2011
- “The Two States of Star Forming Clouds”, *Enzo Developers Workshop*, Columbia University, October 14, 2011
- “Mass and Magnetic Distributions in Simulations of Supersonic, Super Alfvénic, Self Gravitating MHD Simulations”, *The Future of Astro Computing*, San Diego Supercomputer Center, December 16, 2010
- “Where’s the Stuff? Mass and Magnetic Distributions in Simulations of Supersonic, Super Alfvénic, Self Gravitating MHD Simulations”, *Theoretical Astrophysics in Southern California*, California Institute of Technology, October 29, 2010
- “AMR MHD Simulations of Self Gravitating Super Alfvénic Turbulence”, *From Stars to Galaxies*, University of Florida, April 2010

COMPUTER EXPERIENCE

Languages C, C++, Fortran, Python, shell scripting, IDL, Javascript, HTML, CSS, AJAX

Platforms Linux, Unix (AIX, Solaris), Macintosh OS X

Other tools MPI Parallel library, Totalview parallel debugger, HDF5 data format, parallel computing architectures

Algorithms Computational fluid dynamics and magnetohydrodynamics, adaptive mesh refinement, general numerical integration