

David Christopher Collins

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EDUCATION

University of California San Diego Ph.D., Physics, 2009

Thesis: *Star Formation with Adaptive Mesh Refinement and Magnetohydrodynamics*

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

EMPLOYMENT

Assistant Professor, Florida State University 2013-present

Nicholas C. Metropolis Postdoctoral Fellow, Los Alamos National Lab 2011-2013

Advisors: Hui Li, James H. Cooley

Postdoctoral Scholar, University of California, San Diego 2009-2011

Advisor: Alexei G. Kritsuk

Graduate Research Assistant, UCSD 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

PUBLICATIONS

"Magneto-Hydrodynamical Effects on Nuclear Deflagration Fronts in Type Ia Supernovae" Hristov, Boyan; Collins, David C.; Hoefflich, Peter; Weatherford, Charles A.; Diamond, Tiara R., Arxiv 1711.11103

"The Anatomy of the Column Density Probability Distribution Function (N-PDF)" Chen, H., Burkhart, B., Goodman, A. A., Collins, D. C. Arxiv 1707.09356

"Signatures of progenitors of Type Ia supernovae" Hoefflich, P.; Chakraborty, S.; Comaskey, W.; Fisher, A.; Hristov, B.; Collins, D.; Diamond, T. R.; Dragulin, P.; Hsiao, E. Y.; Sadler, B. Conference, Memorie della Societa Astronomica Italiana, v.88, p.302 (2017)

"GMC Collisions as Triggers of Star Formation. III. Density and Magnetically Regulated Star Formation" Wu, B., Tan, J. C., Christie, D., Nakamura, F., Van Loo, S., Collins, D. C. ApJ, 2017, 841, 888

"The Razors Edge of Collapse: The Transition Point from Lognormal to Power-Law Distributions in Molecular Clouds," Burkhart, B., Stalpes, K., Collins, D. C., ApJ, 2017, 834,1

"GMC Collisions as Triggers of Star Formation. II. 3D Turbulent, Magnetized Simulations" Wu, B., Tan, J. C., Nakamura, F., Van Loo, S., Christie, D., Collins, D. C., ApJ, 2017, 835, 137

“Matching dust emission structures and magnetic field in high-latitude cloud L1642: comparing Herschel and Planck maps,” Malinen, J.; Montier, L.; Montillaud, J.; Juvela, M.; Ristorcelli, I.; Clark, S. E.; Berné, O.; Bernard, J.-Ph.; Pelkonen, V.-M.; Collins, D. C. *Monthly Notices of the Royal Astronomical Society*, 2016, 460, 1934

“Length Scales and Turbulent Properties of Magnetic Fields in Simulated Galaxy Clusters,” Egan, OShea, Hallman, Burns, Xu, Collins, Li, Norman submitted to *ApJ*, arxiv 1601.05083

“Self-Generated Turbulence in Magnetic Reconnection”, Oishi, J. S., Mac Low, M., Collins, D. C., Tamura, M. *Astrophysical Journal Letters*, 2015, 120

“Observational Diagnostics of Self-Gravitating MHD Turbulence in Giant Molecular Clouds”, Burkhart, B., Collins, D. DC., Lazarian, A. *Astrophysical Journal*, 2015, 808, 48

“Enzo: An Adaptive Mesh Refinement Code for Astrophysics”, Bryan, G. L. , Norman, M. L. , O’Shea, B. W. , Abel, T. , Wise, J. H. , Turk, M. J. , Reynolds, D. R. , Collins, D. C. , Wang, P. , Skillman, S. W. , Smith, B. , Harkness, R. P. , Bordner, J. , Kim, J.-h. , Kuhlen, M. , Xu, H. , Goldbaum, N. , Hummels, C. , Kritsuk, A. G. , Tasker, E., Skory, S. , Simpson, C. M. , Hahn, O. , Oishi, J. S. , So, G. C. , Zhao, F. , Cen, R. , Li, Y. D, *Astrophysical Journal Supplement*, 2014, 211

“Local Support Against Gravity in Magnetoturbulent Fluids”, Schmidt, W., Collins, D. C., Kritsuk, A. G., *Monthly Notices of the Royal Astronomical Society*, 2013, 43,

“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., *Astrophysical Journal*, 2013, 765, 21

“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

Invited Presentations

“Whats the Deal with Dark Matter?” FSU, *Society of Physics Students*, March 6, 2018

“Whats the Deal with Dark Matter?” FSU, *Quarknet 2017*, July 25, 2017

“Rayleigh Taylor Instabilities in Magnetized Supernovae,” FSU, *50th Anniversary of GFDI*, May 15, 2017

“Whats the Deal with Dark Matter?” July 18, 2016, and informal presentation at the Mag Lab for the participants in the *Research Experience for Teachers* program.

“Astrophysical Turbulence: Nuclear Flame Propagation with Magnetic Fields,” *Complex Interfaces in Geophysical and Astrophysical Fluid Dynamics*, April 29, 2016, FSU

“Magnetic Fields, Turbulence, Gravity, and Star Formation,” FSU Department of Scientific Computing, October 27, 2015 “Stop Using Virial Theorem for Star Forming Clouds”, *Institute for Theory and Computation Seminar*, Harvard Center for Astrophysics, April 8, 2015

“Turbulent Star Formation Theory”, *Institute for Theory and Computation Pizza Lunch Series*, Harvard Center for Astrophysics, April 7, 2015

“Magnetic Fields, Turbulence, Gravity, and Star Formation”, *Geophysical Fluid Dynamics Institute*, FSU, September 22, 2014

“Observational Diagnostics of Self Gravitating MHD Turbulence in GMCs”, *Astrophysics Seminar*, FSU, September 16, 2014

“Magnetic Fields, Turbulence, Gravity and Star Formation,” Invited Seminar, University of Florida, February 6, 2014

“Magnetic Fields, Turbulence, Gravity and Star Formation,” Invited Seminar, Florida State University, February 5, 2013

“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

“EE- and BB- mode signatures of Single Phase Turbulence” UC San Diego, *CMB Foregrounds Workshop*, Nov. 28, 2017

“Properties of Molecular Cloud Column Densities,” University of Florida, *Florida Star & Planet Formation Days*, May 17, 2017

“Magnetic and Density Statistics in Collapsing Molecular Clouds Cores with MHD,” *Star Formation, Magnetic Fields, Diffuse Matter in the Galaxy*, University of Wisconsin, Madison, Wisconsin, May 25, 2016

“Magnetic Fields in Collapsing Molecular Clouds” *From Stars to Massive Stars*, University of Florida, Gainesville, FL April 6, 2016

“Line of Sight Contamination vs. Virial Parameters,” *Florida Star & Planet Formation Days*, University of Florida, March 20, 2016

“Physical Process in Prestellar Cores”, *Florida Star & Planet Formation Days*, University of Florida, March 13 2015

“Local support against gravity in magnetoturbulent fluids”, *Midwest Magnetic Fields*, University of Wisconsin, Madison, April 29 2014

“What Turbulence Does”, *Florida Star & Planet Formation Day*, University of Florida, March 14 2014

“Magnetic Field Distributions in Self-gravitating supersonic turbulence”, *Midwest Magnetic Fields*, University of Wisconsin, Madison, May 1 2013

“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