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Education

Dates	School	Degrees Received	Location
2003–2012	University of Rochester	PhD, Physics & Astronomy (2012) MA, Physics (2007)	Rochester, NY, USA
2002-2003	SUNY Binghamton	Non-Matriculated	Binghamton, NY, USA
1997–2001	Asbury College	BA, Mathematics (2001)	Wilmore, KY, USA

Awards

- Susumu Okubo Prize for excellent performance in graduate course work and on the Preliminary Exam at the University of Rochester.
- Kenyon Science Award in recognition of being the outstanding science graduate for the year at Asbury College.

Research Experience

08/2012–present: **Post Doctoral Associate, Physics & Astronomy, U. of Rochester**

As a postdoc at the University of Rochester I am working with Adam Frank to investigate the formation and evolution of molecular clouds from various initial conditions to provide observational constraints on differing formation scenarios.

08/2003–08/2012: **Graduate Student, Physics & Astronomy, U. of Rochester**

As a graduate student at the University of Rochester I developed a parallel magnetohydrodynamics code AstroCUB that I used to study the properties of outflow driven turbulence within molecular clouds. I then worked on redesigning the adaptive mesh refinement code AstroBEAR to improve scaling from 10's of processors to 10's of 1000's of processors. I was the primary developer of the new AMR engine as well as the various modules used to simplify the generation of initial/boundary conditions. Due to being the primary developer of AstroBEAR, I spent much of my time providing support in the form of debugging/documenting/training within our research group as well as to collaborators at other institutions. I also used AstroBEAR to investigate the formation of molecular clouds via the collision of streams of gas within the interstellar medium as well as collaborate on several other projects involving disks, jets, and heterogenous media.

05/2000–08/2000: **Undergraduate Researcher, Dept. of Biology, University of Kentucky**

At the University of Kentucky I worked with David Randall and Don Burgess in developing numerical models to analyze blood pressure and heart rate correlations in rats with spinal cord transections. I wrote programs in C as well as perl scripts to automate the data analysis.

Volunteer Experience

01/2004–01/2006: **Travel abroad, Volunteer with AmeriCorps, Site supervisor for Habitat for Humanity, Omaha,**

After a semester of graduate school at the University of Rochester I took a two year leave of absence to travel abroad and to volunteer with Habitat for Humanity. I spent 2 months in Calcutta volunteering with the Missionaries of Charity (Mother Teresa's order). I then spent a year volunteering with the AmeriCorps program working with Habitat for Humanity in Omaha, NE. Following my year of service I was then hired as a site

supervisor where I coordinated home construction with AmeriCorps, volunteers, and new home owners before returning to graduate school.

08/2001–05/2002: **Taught High School Math, Physics, and Physical Education in Santa Cruz, Bolivia**

After graduating from Asbury College I spent a year as a volunteer teacher at the Santa Cruz Christian Learning Center in Santa Cruz, Bolivia. Though not receiving any formal training in high school education, I managed to quickly learn how to prepare lessons and manage a classroom. During my year I taught high school algebra, geometry, physics, and physical education. The classes were fairly small (16-20) and the students were an interesting mix of children of upper class Bolivians and Western missionaries.

Computer Skills

Proficiency:	Fortran, C, C++, Visual Basic; MPI, Hypre, FFTW, HDF5;
	MATLAB, Maple, MS Office/Open Office suite, HTML; Windows, Linux;
Competency:	LaTeX, Portable Batch System, LoadLeveler, Load Sharing Facility
Basic Knowledge:	Java, Python, PERL, Javascript, Mathematica, Interactive Data Language (IDL)

Publications

Carroll-Nellenback, J. J., Frank, A., & Heitsch, F., "The Effects of Inhomogeneities within Colliding Flows on the Formation and Evolution of Molecular Clouds", (in preparation)

Carroll-Nellenback, J. J., Shroyer, B., Frank, A., & Ding, C, "Efficient Parallelization for AMR MHD Multiphysics Calculations: Implementation in AstroBEAR", arxiv:1112.1710 (Accepted to the *Journal of Computational Physics*)

Carroll, J. J., Frank, A., Blackman, & E. G., "Isotropically Driven Versus Outflow Driven Turbulence: Observational Consequences for Molecular Clouds", *Astrophysical Journal* 2010, 722, 145-157

Carroll, J. J., Frank, A., Blackman, E. G., Cunningham, A. J., & Quillen, A. C., "Outflow-Driven Turbulence in Molecular Clouds", *Astrophysical Journal* 2009, 695, 1376-1381

Cunningham, A. J., Frank, A., **Carroll, J. J.**, Blackman, E. G., & Quillen, A. C., "Protostellar Outflow Evolution in Turbulent Environments", *Astrophysical Journal* 2009, 692, 816-826

Huarte-Espinosa, M., **Carroll-Nellenback, J. J.**, Nordhaus, J., Frank, A., & Blackman, E. G., "The Formation and Evolution of Wind-Capture Disks In Binary Systems" , (in preparation)

Randall, D, Baldridge, B., Zimmerman, E., **Carroll, J. J.**, Speakman, R., Brown, D., Taylor, R., Patwardhan, A., & Burgess, D, "Blood pressure power within frequency range ~ 0.4 Hz in rat conforms to self-similar scaling following spinal cord transection", *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology* 2005, 288, 737

Talks and Posters

Carroll-Nellenback, J. J., Shroyer, B., Frank, A., & Ding, C., "Efficient Parallelization for AMR MHD Multiphysics Calculations: Implementation in AstroBEAR", ASPC 2012, 459, 291C

Carroll, J. J., Frank, A., Blackman, E. G., Cunningham, A. J., & Quillen, A. C., "Outflow Driven Turbulence in Molecular Clouds: MHD Simulation Studies", AAS 2009, 21442506C

Carroll, J. J., Frank, A., "The Dynamics Of Protostellar Outflow Interactions", AAS 2007, 211.9201C

Haig, C. M., Heitsch, F., **Carroll, J. J.**, & Frank, A., "Effects of Shear and Magnetic Fields on Molecular Cloud Formation in the Flow-Driven Picture in 2D", AAS 2012, 21934902H

Shroyer, B., Cunningham, A. J., Frank, A., Poludnenko, A., Jones, T., Yirak, K., & **Carroll, J. J.**, "Radiative MHD Shocks in Heterogeous Media", AAS 2009, 21442506C