Andrew J. Emerick

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Research Interests

Intend to focus on computational astrophysics. Previous astronomy work has included magnetohydrodynamical simulations of astrophysical plasmas, and the study of radio halos in galaxy clusters

Education

Columbia University,

Ph.D., Astronomy, *Expected:* 2018/2019

University of Minnesota, Minneapolis, MN

B.S., Astrophysics, May 2013

- Summa Cum Laude, with Distinction
- Thesis Topic: *Evolution of Weak Magnetic Fields in a Turbulent Plasma: A Galaxy Cluster Context*
- Advisor: Thomas W. Jones, Ph.D.

B.S., Physics, May 2013

- Graduated with Distinction

Research Experience

Undergraduate Research Assistant Dec. 2011 - Aug. 2013
Minnesota Institute of Astrophysics, University of Minnesota - Minneapolis, MN
Supervisor: Thomas W. Jones, Ph.D and David Porter, Ph.D

- Studying evolution of weak magnetic fields in turbulent plasmas using ideal MHD simulations at the Minnesota Supercomputing Institute.
- A portion of this research constituted my senior undergraduate thesis.

Undergraduate Research Assistant Jan. 2012 - May 2012
Department of Physics, University of Minnesota - Minneapolis, MN
Supervisor: Priscilla Cushman, Ph.D

- Worked with partner to characterize the gamma ray background in the Cryogenic Dark Matter Search detector testing facility.
- Used high purity germanium detector to lay groundwork for construction of appropriate lead shielding for testing apparatus.

Undergraduate Research Assistant Oct. 2009 - Sep. 2011
Minnesota Institute for Astrophysics, University of Minnesota - Minneapolis, MN
Supervisor: Lawrence Rudnick, Ph.D

- Worked on data processing and quality control for Green Bank Telescope observations done by graduate student
- Studied evolution of galaxy clusters using cluster radio halos as probes. Stacked faint, diffuse halos to independently confirm bi-modal distribution in radio halo properties.

Research Experience for Undergraduates Summer 2011
Cyclotron Institute, Texas A&M University - College Station, TX
Supervisor: Ralf Rapp, Ph.D

- Utilized analytical reproduction of lattice QCD results to motive revisit of problem of bottomonium binding scenarios in the QGP.
- Used new understandings to update bottomonium production code to predict via observables, bottomonium yields at both RHIC and LHC.

Research Assistant Summer 2010
Bonner Nuclear Laboratories, Rice University - Houston, TX
Supervisor: Pablo Yepes, Ph.D

- Utilized Monte Carlo and first principles code to simulate proton radiation therapy.
- Improved first principles code with goal of more efficiently calculating relevant parameters in a fraction of Monte Carlo simulation run-times.

Refereed Journal Publications

1. **A. Emerick**, X. Zhao, R. Rapp, "Bottomonia in the Quark-Gluon Plasma and their Production at RHIC and LHC", *Eur. Phys. J. A* (2012) **47**:72
   doi: 10.1140/epja/i2012-12072-y
2. S. Brown, **A. Emerick**, L. Rudnick, G. Brunetti, "Probing the Off-State of Cluster Radio Halos, 2011 *ApJ* **740** L28 doi: 10.1088/2041-82505/740/1/L28

Conference Publications

1. X. Zhao, **A. Emerick**, R. Rapp, "In-Medium Quarkonia at SPS, RHIC, and LHC" *Nuclear Physics A, Vol. 904, p. 611-614c.* Quark Matter 2012 - Proceedings. Abstract
2. **A. Emerick**, T.W. Jones, D. Porter, "Simulation of Turbulence and Magnetic Field Evolution in Astrophysical Plasmas", *UMN Digital Conservatory: Undergraduate Research Presentations.* Poster
3. **A. Emerick**, X. Zhao, R. Rapp, "Bottomonium in the QGP: production at RHIC and LHC." *Fall Meeting of the APS Division of Nuclear Physics: Bulletin of the American Physical Society, Volume 56, Number 12.* Poster abstract
4. **A. Emerick**, S. Brown, L. Rudnick, "Stacking Detection of Diffuse Radio Halo Emission in Galaxy Clusters". In: *AAS Meeting # 218, # 408.26; Bulletin of the American Astronomical Society, Vol. 43, 201.* Poster abstract.
5. **A. Emerick**, S. Brown, L. Rudnick, "Examination of Radio Halos and Corresponding X-ray Emission in Galaxy Clusters", *UMN Digital Conservatory: Undergraduate Research Presentations.* Poster.

Unpublished Works

1. **A. Emerick**, "Evolution of Weak Magnetic Fields in a Turbulent Plasma: A Galaxy Cluster Context", *Submitted to the University Honors Program at the University of Minnesota in partial fullfillment of the requirements for the degree of Bachelor of Science summa cum laude in Astrophysics.* Full paper

Awards

Graduate Awards

- Dean's Fellowship — Fall 2013, 5 yr
  Department of Astronomy, Columbia University

Travel Awards

- Conference Experience for Undergraduates — Oct. 2011
  APS DNP Fall Meeting
- Funding from University of Minnesota and APS Minority Scholarship — May 2011
  AAS 218^{th} Meeting - Summer Boston

Research Grants

- Undergraduate Research Opportunities Program Grant — Spring 2012
  University of Minnesota
- Undergraduate Research Opportunities Program Grant — Fall 2010
  University of Minnesota

Undergraduate Scholarships

- J. Morris Blair Scholarship in Physics — 2012-2013
  Dept. of Physics (UMN)
- Laverne and Ted Jones Undergraduate Scholarship — 2012-2013
  Minnesota Institute for Astrophysics (UMN)
- Astronaut Scholarship Foundation Scholarship — 2012-2013
- Minnesota Space Grant Consortium Scholarship — Spring 2011 and 2012
- Franklin Scholarship — Fall 2011
  School of Physics and Astronomy (UMN)
- American Physical Society Minority Scholarship — 2010-2012
- Gold National Scholarship — 2009-2013
  University of Minnesota

Organizations

- American Physical Society (APS); Society of Physics Students (SPS), Sigma Pi Sigma: Physics Honors Society

Skills

Computer Programming:

- C, C++, Fortran, LabVIEW, LaTex, Python, UNIX shell scripting, GNU make

References

Thomas W. Jones
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Minnesota Institute for Astrophysics — E-mail: twj@astro.umn.edu
University of Minnesota

Lawrence Rudnick
Distinguished Teaching Professor — Phone: 612-624-3396
Minnesota Institute for Astrophysics — E-mail: larry@astro.umn.edu
University of Minnesota