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Matthew Kirby

Education

2013–Present **Ph.D.**, *Department of Physics, University of Arizona*, Tucson, Arizona.
Anticipated Completion Spring 2019

2009–2013 **B.S.**, *Department of Physics, Applied Physics, and Astronomy, Cum Laude*, *Rensselaer Polytechnic Institute*, Troy, New York.

Professional Employment

2017–Present **Volunteer**, *Pima Air and Space Museum.*
Redesigning, revitalizing and reworking the Space Gallery at the Pima Air and Space Museum. Designing new exhibits on NASA space missions and the planets to replace existing, antiquated displays.

2015–Present **Research Assistant**, *University of Arizona.*
Advisor: Prof. Eduardo Rozo
Constraining observable-mass relations in galaxy clusters by jointly fitting several mass-proxies with a known selection function.

2014–2015 **Research Assistant**, *University of Arizona.*
Advisor: Prof. Dennis Zaritsky
Explored the physics behind the evolution of galaxies in the outskirts of galaxy clusters at intermediate redshifts ($z \sim 0.5$) using data taken with the Hubble space telescope.

2013–2014 **Research Assistant**, *University of Arizona.*
Advisor: Prof. Elliot Cheu
Developed code in C++ to simulate and observe the effects of the intergalactic medium on photometric redshift maximum likelihood calculations in preparation for LSST.

2013–2017 **Teaching Assistant**, *University of Arizona.*
Introductory, algebra based mechanics for non-science and biology majors.
Algebra based electricity and magnetism for non-science and biology majors.
Introductory, calculus based mechanics for science majors and engineers.
Calculus based electricity and magnetism for science majors and engineers.
Introduction to programming for physics applications.

2011–2013 **Research Assistant**, *Rensselaer Polytechnic Institute.*
Advisor: Prof. Gyorgy Korniss
Developed a program in C++ to model and perform experiments involving the time-evolution of opinions on complex social networks.

Teaching

Fall 2015 **Lecturer**, *Physics 102.*
Delivered lectures on mechanics using algebra to non-science and biology majors. Spent four weeks teaching in the collaborative learning space pilot program where I engaged the students in active learning techniques.

Summer 2014 **Primary Instructor**, *Physics 103.*
Developed and delivered an algebra based 4.5 week course on electricity and magnetism to non-science and biology majors. Used collaborative learning techniques to get the students more actively involved in the lectures.

2013-2017 **Graduate Teaching Assistant**.
For a number of semesters, I instructed the lab portion of the course on calculus based mechanics and calculus based electricity and magnetism. I lead discussion sections for calculus based mechanics and I was a teaching assistant in an introductory course on scientific computing.

Awards

2018 **University of Arizona Department of Physics Fanfare Award**.

2018 **University of Arizona Graduate and Professional Student Association Travel Grant**.

2018 **LSST Dark Energy Science Collaboration Travel Grant**.

2017 **Outstanding Graduate Student Speaking Award**.

2017-2018 **UA Nasa Space Grant Fellowship**.

2017 **LSST Dark Energy Science Collaboration Travel Grant**.

2016 **Outstanding Graduate Student Speaking Award**.

Professional Development

February 2018 **LSST DESC Dark Energy School**, *SLAC National Accelerator Lab.*
Attended a one day workshop on good coding practices and astronomical instrumentation.

August 2017 **SLAC Summer Institute**, *SLAC National Accelerator Lab.*
Attended a two-week summer school covering a variety of topics relating to dark matter and cosmology.

July 2017 **LSST DESC Dark Energy School**, *Stony Brook University.*
Attended a one day workshop on machine learning and galaxy clusters.

Spring 2015 **Software Carpentry Workshop**, *University of Arizona.*
Attended workshop designed to increase familiarity with bash, Unix, iPlant, and git.

Fall 2014 **Collaborative Learning Space Pilot Project**, *University of Arizona.*
Invited to participate in four-week program designed to test innovative collaborative methods of teaching large classes.

Service

Spring 2018 **Graduate Student Invited Colloquium Speaker**.
Organized the solicitation and voting of a candidate to be invited by the graduate student body to give a physics department colloquium.

Spring 2016–Present **Cosmology Journal Club**.
Organize and coordinate a journal club between faculty, postdocs, graduate and undergraduate students where we discuss new methods and results in cosmology.

Spring 2015–Present **Physics Graduate Student Council**.
Organize weekly meetings between graduate students and visiting colloquium speakers as well as weekly graduate student seminars. Act as a liaison between the physics graduate students and the department regarding graduate student funding and qualifying exams.

Technical Skills

Python **Advanced**.

C/C++ **Advanced**.

Machine Learning **Moderate**.

LaTeX **Advanced**.

MATLAB **Basic**.

Unix **Advanced**.

Publications

1. Kirby, M. et al. "The scatter in the richness-mass relation of a complete sample of SDSS redMaPPer galaxy clusters", In Prep.
2. Kirby, M. et al. "The evolution of galaxies in cluster infall regions at intermediate redshifts", In Prep.
3. Almoubayyed, Husni et al. "Core Cosmology Library: Precision cosmological predictions for LSST", in Prep.
4. Just, D., Kirby, M., et al. "Preprocessing among the infalling galaxy population of EDISCS clusters.", in Prep.
5. Xie, J., Emenheiser, J., Kirby, M., et al. "Evolution of opinions on social networks in the presence of competing committed groups", 2012 (PLoS ONE 2012).

Past Presentations

1. **Measuring Redshifts to Distant Objects in the Universe**
   March 2018 - University of Arizona Graduate Student Seminar
2. **The Scatter in Cluster Scaling Relations with a Complete Cluster Sample**
   March 2018 - SnowCluster 2018 (Poster)
3. **Scaling Relations with a Complete Cluster Sample**
   February 2018 - LSST Dark Energy Science Collaboration Meeting
4. **Clustering Algorithms and Correlation Functions**
   October 2017 - Data Mining and Machine Learning in Astronomy Seminar Course
5. **The Search for Dark Matter**
   September 2017 - University of Arizona Graduate Student Seminar
   Outstanding Graduate Student Speaking Award Winning
6. **Weighing the Most Massive Objects in the Universe**
   April 2017 - University of Arizona Graduate Student Talks
7. **What is an Ultra Diffuse Galaxy and Why do we Care?**
   September 2016 - University of Arizona Graduate Student Seminar

Outstanding Graduate Student Speaking Award Winning

8. **What Can We Learn from Tidal Debris?**
   December 2015 - KASI-Arizona Collaboration Meeting
9. **Galactic Ghosts: What Can We Learn From Stellar Streams**
   November 2015 - University of Arizona Graduate Student Seminar
10. **The Evolution of Galaxies**
    May 2015 - University of Arizona Graduate Student Seminar
11. **The Impact of Committed Agents in a Time-Varying Network**
    October 2012 - Greater Boston Area Statistical Mechanics Meeting, Brandeis University