

ALEX DEICH

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Education

Reed College, Portland, Oregon

May 2016

BA in Physics

Senior thesis: *Particle Dynamics in a Time-Dependent Kerr Geometry* [PDF](#)

Research Experience

Note: Many of the projects listed have associated reports and code, which are linked to where appropriate. These and other projects are also available on <http://deichdeich.github.io>.

Oregon State University [Preprint](#) [PDF](#)
Researcher

July 2016 - Present

- Built an analysis package in Python for investigating the physics of gamma-ray bursts.
- Derived analytical relationships for the energetics of short gamma-ray bursts.
- Co-authored a paper based on this research, in prep.

Reed College [code](#), [PDF](#)
Senior Thesis

September 2015 - May 2016

- Wrote an extensive n-body code to investigate large numbers of particles in a Kerr geometry which varied in time.
- Probed the system numerically and analytically to determine how a changing spin of the central body affects the trajectories of particles orbiting it.

University of Utah [code](#)
Research Assistant

June 2014 - August 2015

- Designed data fits to derive reddening values and metallicity from wide-field Hubble data of young stars in the Andromeda galaxy to look for a gradient in metallicity across the galaxy.
- Wrote a tool which allowed the user to interact with large data sets graphically. The user can select regions of data, and plot or perform analysis on those data.
- Performed Monte Carlo simulations of stellar populations of various ages, which we used to refine the parameters of our data.
- Presented the project at the 2015 meeting of AAS in Seattle, Washington, where it was a finalist for the Chambliss Award for Undergraduate Research.

Cerro-Tololo Interamerican Observatory
Research Assistant

January - March 2013

- Worked at the Cerro-Tololo Interamerican Observatory (CTIO) in La Serena, Chile in an NSF-funded REU.
- Worked with Dr. Alexandre Roman-Lopes of the Universidad de La Serena and Andrea Kunder of CTIO photometry of open clusters from the Vista Variables in the Via Lactea (VVV) Survey
- By matching sources with the 2MASS survey, I derived correlations between the two surveys, which determined error in the VVV data.
- I presented the project at the winter 2014 meeting of the AAS conference in Washington, DC.

Projects

Physics of a Modified E&M [PDF](#)
Reed College

2015

- The final project for my E&M II class. I analyzed a Lagrangian similar to the standard E&M Lagrangian, but with an additional coupling term.
- The final part of the project was left up to the individual student. I chose to derive the equations of magnetohydrodynamics for this system and perform some CFD modeling.
- I modeled this by editing the PLUTO MHD simulation code

Exoplanet Lightcurve Fitting [code](#)
Reed College

2015

- I independently wrote a small Python script to fit analytically determined light-curves to data.
- The script used a steepest-descent algorithm to determine the fit.

Teaching Experience

Freelance Tutor

2016-Present

- I have tutored about a dozen individuals in GRE, SAT, and college math and physics.
- In addition to in-person sessions, I design lessons and problem sets

Reed College Science Outreach
Teacher

2014 - 2015

- I taught science to 10- and 11-year-olds at Lewis Elementary and Ventura Park Elementary schools in southeast Portland.
- Topics included chemistry, biology, and physics. Lessons emphasized hands-on learning in small groups, with minimal lecturing.
- In addition to in-class work, my duties included lab design and set-up.

Presentations

Calculating the Cocoon Energy of Short GRB's
Oregon State University

October 2016

Particle Dynamics in a Time-Dependent Kerr Geometry
Reed College

May 2016

PHAT Youths: Determining Metallicity for Hot Young Stars in M31
American Astronomical Society

January 2015

- Chambliss Award Honorable Mention for Undergraduate Research

Photometric Analysis of Clusters in the Vista Variables in the Via Lactea (VVV) Survey
American Astronomical Society

January 2014