Kirk Long

1440 N Locust Grove Rd
BLDG 34 APT B
Meridian, ID, 83642

+1 (208) 297-0396
kirklong@u.boisestate.edu
https://linkedin.com/in/kirkalan

Research Interests

I am enthralled by the advances in modern computing that have enabled us to analyze data-sets of enormous magnitudes as well as numerically simulate systems with an unprecedented level of detail. I enjoy analyzing interesting physics/astronomy problems from a computational perspective, and I am particularly fascinated by dense stellar objects and the processes that form them (including the various flavors of neutron stars) as well as the evolution of our universe and the systems in it. I have enjoyed combining these passions in my research thus far, which has focused on identifying accreting pulsars in x-ray binaries.

Education

08/2017 – 05/2020   **Boise State University**, Honors College
Bachelors of Science in Physics, Astrophysics emphasis
Minors in Music and Applied Mathematics

Cumulative GPA (including transfer credits): 3.859/4.0
Physics GPA: 4.0/4.0 (calculation counts 1 instance of A- turned A after retake)
Best GRE Scores: 166 (89th %) Quantitative — 164 (94th %) Verbal
5.5 (98th %) Analytical Writing

08/2015 – 05/2017   **Idaho State University**
Attended prior to transferring to Boise State, originally intended to major in math and music here.

Research Experience

04/2019 –   **Identifying accreting x-ray binaries**, Boise State University

Mentored by Dr. Daryl Macomb, code sample available at: https://github.com/kirklong
- Analyzed archival data taken with both the CHANDRA and XMM-Newton orbital X-ray observatories.
- Reduced data and extracted light curves using HEASOFT and SAS.
- Used FFT analysis to find periods of pulsar sources.
- Compared periods of identical sources in data collected by both instruments over time to detect changes in period that could indicate accretion.
- Generated background map from all data to state statistical significance in detections.

Teaching Experience

08/2018 –   **Physics Lab Instructor**, Boise State University Department of Physics

Responsible for teaching, grading, and managing class of students ($\sim$25/class).
Evaluations available for all courses upon request. Courses taught include:

- PHYS 111 (General Physics I, Fa 2018)
- PHYS 105 (Introductory Stars and Cosmology, Sp 2019)
- PHYS 101 (Survey of Physics, Fa 2019)
- PHYS 204 (Introductory Astronomy, Fa 2019)

08/2018 –   **Physics Tutor**, Boise State University Department of Physics

1/2 students selected by Department to host drop-in tutoring lab (lead tutor 2019-2020).
Taught mostly lower-division coursework but occasionally helped with more advanced topics.
Average attendance per session: $\sim$5 students.

01/2019 – **Volunteer**, Idaho Department of Corrections
Inspired by Bryan Stevenson's *Just Mercy* to start program for inmates to learn STEM skills.

Taught introductory programming (Python) class 1 hour/week with partial summer hiatus.
- Created curriculum based on programming classes taken and research experiences.
- Built Jupyter Notebook "labs" for inmates to follow.

Outreach

06/2015 – **Telescope Operator**, Bruneau Sand Dunes State Park Observatory
Former volunteer of >300 hours before being hired in March of 2017.

Responsible for maintenance and operation of various large telescopes and
related equipment.
- Used telescopes to show visitors celestial objects with accompanying explanations
  of both objects and equipment.
- Experience with various makes of telescopes with apertures up to 0.64 m (25").
- Can find many popular deep-sky objects without computer assistance.

Tasked with creating and giving ∼45 minute public talks/presentations.
- Topics curated from latest research and most popular phenomena in astronomy,
  distilled into form digestable by those without any previous background knowledge.
- Average crowd size: ∼150. Total visitors during employment: >20,000.

01/2019 – **Volunteer**, Idaho Department of Corrections
Work detailed here in addition to volunteer teaching detailed above.

Brought outreach events each week to local prisons to stimulate interest/continued
attendance in prison education programs (supplied by BSU Physics Department).
Occasionally helped with GED lessons when applicable to physics.
Originally volunteered at just men's facility but have recently started expansion
into women's as well.

Press: Featured on Boise State University website (08/2019) and on local news
channel KIVI (11/2019).

05/2016 – **STEM Lead**, Treasure Valley Family YMCA

In charge of writing STEM curricula for summer camps and after school programs
for all 4 local YMCA branches, including coding and physics programs.
Responsible for purchasing and maintaining related equipment.
Trained staff on STEM concepts and effective ways to teach them.
Taught youth participants in STEM programs.
- Engaged and inspired ∼1,000 program attendees during employment.
- No child turned away: ∼1/5 of participants received financial assistance.
- Parent comments on STEM programs available upon request.

Collected and analyzed budget and participant data throughout summer months.

08/2016 – 08/2018 **Intern**, *StarTalk*

Wrote blog posts on convoluted and/or newsworthy astronomy/physics topics.
- Posts disseminated to online audience of >500,000.
- Writing can be found by searching for my name on the *StarTalk*
  website: https://www.startalkradio.net/?s=kirk+long
- Occasionally still write guest posts, but main affilliation ended 2018 due to
  uneasingness regarding accusations against Neil.

Responsible for researching and writing outreach posts for social media.
Occasionally visited American Museum of Natural History and other locations in
NYC to help with show production and meet cool people.

Scholarships and Awards

2015 – 2017	Presidential Scholarship	$10,000
2017 – 2018	Dean's Transfer Scholarship	$3,000
2018 – 2019	Whitlock Math and Science Award	$800
2018 – 2019	BSU Foundation Honors Award	$1,500
2018 – 2019	Physics Department Scholarship	$1,000
2019 – 2020	Honcik Physics Scholarship	$3,000
2019 – 2020	George Campbell Memorial Award	$2,800
2016 –	Dean's List	

Skills (rated basic – expert)

- **Programming Languages:**
  - Advanced: Python, Julia
  - Competent: Matlab, Bash
  - Basic: Perl, Fortran
- **Software:**
  - Expert: Microsoft Office Suite
  - Advanced: Jupyter Lab/Notebook, Anaconda, terminal/command line
  - Beginner: HEASOFT, SAS, LaTeX
  - Basic: MESA, Git
- **Operating Systems:**
  - Advanced: Windows 10
  - Competent: Mac OSX, Linux (Mint)

Posters and Publications

Macomb, D. & **Long, K.** (2020). Identifying accreting x-ray binaries. *In preparation.*

Long, K. (2018). *To the Moon and Back – Simulating the Trajectory of a Multi-Stage Rocket Similar to Saturn V in an Apollo 8 Mission Analogue.*

Poster available on Github (https://github.com/kirklong/Posters), presented on:

- 02/2019: Research Computing Days, Boise State University
- 12/2018: Won best class poster from PHYS 325 (Scientific Computing)

Barkley, K., Belnap, K., Keller, M., Larson, J., **Long, K.**, McCarthy, K., Myers, M., & Withers, J. (2017). *Idaho State University.* Charleston, SC: Arcadia. ISBN: 1467125512.

Relevant Coursework

Physics & Math:	Classical Mechanics (**Taylor**), Electrostatics and Electrodynamics (**Griffiths**), Introductory Quantum Mechanics (**Krane**), Introductory Relativity/Particle Physics, Optics (**Pedrotti**), Thermal and Statistical Physics (**Schroeder**), Astrophysics, Engineering Physics (**Knight**), Cosmology (Sp 20), Circuits (Sp 20), Linear Algebra, Single/Multivariable Calculus (**Stewart**), Ordinary Differential Equations (**Boyce/DiPrima**)
Computing:	Scientific Computing (**Newman**), Computational Mathematics, Parallel Scientific Computing (Sp 20), Introductory Computer Science

Extracurricular Activities

I enjoy spending time outdoors (particularly hiking and skiing), tinkering with amateur science projects (I've built cloud chambers, homemade rockets and fireworks, DIY telescopes, a brick kiln for metallurgical experimentation, and more), and making and teaching music (I've partly financed my studies thus far working at a local studio). I particularly enjoy learning and performing classical piano works—the latest addition to my repertoire is Gershwin's *Rhapsody in Blue* and my favorite piece is Rachmaninoff's *Prelude in G Minor.*