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
GRE Scores: 67th % quantitative — 85th % verbal — 98th % writing

08/2015 – 05/2017 **Idaho State University**
Attended prior to transferring to Boise State, originally intended to major in math and music here.
Coauthored book titled "Idaho State University: A Campus History" in collaboration with University Honors Program.

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 (∼25/class).
Evaluations available for all courses upon request.

Courses taught:
- 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: ∼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 Meade, Celestron, and ArgoNavis control systems.
- Experience with all makes of telescope with apertures up to 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

Brought outreach events each week to local prisons to stimulate interest/continued attendance in prison education programs.
Occasionally helped with GED lessons when applicable to physics.
Science labs/demos supplied by BSU Physics Department.

Press: Featured on Boise State University website (08/2019) and on local news channel KTVB (10/2019).

04/2016 – **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 given financial assistance.
- Parent comments on STEM programs available upon request.

Collected and analyzed budget and particiapnt data throughout summer months.

05/2016 – 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.

Responsible for outreach posts on Instagram, Twitter, and Snapchat accounts.
Occasionally visited American Museum of Natural History 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

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)

Relevant Coursework

Physics:	Classical Mechanics (**Taylor**), Electrostatics and Electrodynamics (**Griffiths**), Scientific Computing (**Newman**), Introductory Quantum Mechanics (**Krane**), Optics (**Pedrotti**), Thermal and Statistical Physics (**Schroeder**), Introductory Relativity and Particle Physics, Astrophysics, Cosmology
Mathematics:	Computational Mathematics, Linear Algebra, Single/Multivariable Calculus (**Stewart**), Ordinary Differential Equations (**Boyce/DiPrima**)
Music:	Music Theory I and II, Aural Skills I and II, Choir, Piano, Survey/History of Music

Extracurricular Activities

Music:

- Learnt and performed many classical piano works (favorites: Gershwin's Rhapsody in Blue and Rachmaninoff's Prelude in G Minor).
- Sung and performed with university choir.
- Taught piano at local studio as part-time work.

Amateur Science Tinkering:

- Built DIY rockets (including propellants), fireworks, cloud chamber, telescope, brick kiln, and more!
- Enjoyed teaching friends and incorporating successes into outreach activities.