
Department of Astrophysical and Planetary Sciences
University of Colorado Boulder

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Research Interests

I am broadly excited about employing advances in modern computing to analyze large data-sets and to simulate interesting systems numerically, techniques I am currently using to better understand the true nature of the broad emission line region in active galactic nuclei.

UAT keywords: active galactic nuclei, supermassive black holes, computational astronomy

Education

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| 08/2020 – | University of Colorado Boulder , Dept. of Astrophysical and Planetary Sciences
Ph.D. thesis: “Unraveling the Quasar Broad-Emission Line Region” (working title, degree expected Summer 2026)
M.Sc. awarded December 2023: “A Possible Thin Disk-Wind Launching Mechanism of Broad-Line Emission in AGN Applied to Quasar 3C 273” |
| 08/2017 – 05/2020 | Boise State University , Honors College
B.Sc. in Physics, Astrophysics emphasis, <i>Magna Cum Laude</i>
Minors in Music and Applied Mathematics, recognized as a Graduating Student Leader |
| 08/2015 – 05/2017 | Idaho State University (transferred prior to completing degree) |

Publication List

- “A Convolutional Neural Network for the Recovery of Transfer Functions From Velocity-Resolved Reverberation Mapping Data,” **Long, K.**, Horne, K., Dexter, J., & Tremblay, B., 2025, [Submitted to *ApJ* December 2025](#)
- “BroadLineRegions.jl: A fast and flexible toolkit for modeling the broad-line region (BLR) in Julia,” **Long, K.**, 2025, [Submitted to *JOSS* July 2025 \(awaiting reviewer\)](#)
- “Reverberation Mapping Data of NGC 5548 Imply a Multicomponent Broad-line Region,” **Long, K.** & Dexter, J., 2025, [ApJ, 987, 196](#)
- “Confronting a Thin Disk-Wind Launching Mechanism of Broad-Line Emission in AGN with GRAVITY Observations of Quasar 3C 273,” **Long, K.**, et al. 2023, [ApJ, 953, 184](#)

Awards

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| 2025 | GPSG DEI Excellence Award |
| 2021 – 2022 | Astrophysics Graduate Fellowship (APS department prize) |
| 2015 – 2020 | Dean’s List and \$22,000 in undergraduate scholarship awards |

Press

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| 2023-2024 | “Questions about Quasars: How to Best Weigh a Celestial Body”, <i>JILA Light & Matter</i> , same paper also featured in <i>SciTechDaily</i> |
| 2019-2020 | “Physics Student Brings Science Class to Prison”, Boise State University website, local news channel KIVI, and Boise State University alumni magazine, <i>Focus</i> |

Selected Presentations (*indicates invited)

09/2025	AstroLunch Seminar* , <i>University of St Andrews School of Physics and Astronomy</i> “Unraveling the Quasar Broad-Emission Line Region”	St Andrews, UK
09/2025	Massive Black Holes Across Cosmic Time , <i>Kavli Institute for Cosmology, University of Cambridge</i> Contributed talk: “Unraveling the Quasar Broad-Emission Line Region”	Cambridge, UK
07/2025	Vasto Accretion Meeting , <i>Organized by Durham University and the INAF</i> Contributed talk: “Unraveling the Quasar Broad-Emission Line Region”	Vasto, IT
06/2024	SMBH Sexten , <i>Organized by Chalmers & Virginia Initiatives on Cosmic Origins</i> Contributed talk: “Unraveling the Quasar Broad-Emission Line Region”	Sexten/Sesto, IT

Selected Teaching Experience

01/2023 – 05/2023	Graduate Part-Time Instructor CU Boulder Dept. of Astrophysical and Planetary Sciences Instructor of record for ASTR 2030 Black Holes with enrollment of >100 students. Responsible for all course content and managing TA, grader.
08/2020 – 12/2023	Graduate Teaching Assistant (4 semesters) CU Boulder Dept. of Astrophysical and Planetary Sciences Taught recitations/labs for both lower-division and upper-division courses, assisted with grading assignments/exams, and occasionally assisted in the development of class materials (like Jupyter notebook labs). Courses TA’d: ASTR 3730 (Astrophysics I), ASTR 1040 (Accelerated Intro to Astronomy II), ASTR 2030 (Black Holes)
09/2023 & 10/2025	Invited Guest Lecturer , CU Boulder Dept. of Astrophysical and Planetary Sciences Gave lectures on black holes for Prof. Jason Dexter’s ASTR 2030 Black Holes and Prof. Erica Nelson’s ASTR 1200 Stars and Galaxies courses, each with enrollment of >200 students

Selected Service and Outreach

01/2019 –	Volunteer Instructor , Idaho & Colorado Correctional Facilities Taught introductory programming classes , gave physics and astronomy demonstrations/lectures, and helped > 50 students obtain their GEDs.
01/2020 –	Open-source software contributor (@kirklong) Contributed to various open-source Julia and Python projects as well as distributing my own code in an easily installable format. Top ~2% contributor on StackOverflow . Notable software releases: <ul style="list-style-type: none">• BroadLineRegions.jl – A fast and flexible toolkit for modeling the broad-line region (BLR) in Julia.• BinnedStatistics.jl – An analogue to SciPy stat’s <code>binned_statistic</code> benefitting from performance of native Julia.

- 12/2019 – **@ThreeBodyBot**, #scicomm
Built automated Twitter/Mastodon/Tumblr/BlueSky/YouTube account that posts random three-body simulations ~ 1 /day. Source code [here](#).
- 06/2017 – 08/2020 **Park Astronomer**, Bruneau Sand Dunes State Park Observatory
Operated large telescopes to show visitors celestial objects and gave ~ 45 minute public talks on astronomy topics. Interacted with $>20,000$ total visitors during employment.
- 08/2020 – **Graduate mentor**, CU Boulder (5 students)
Mentored both undergraduate and incoming first-year graduate students on both research and academic topics.
- 08/2020 – **Graduate committee member**, CU Boulder
Served on several department service committees with faculty and other graduate students, influencing departmental policies.

References

- Dr. Jason Dexter**, University of Colorado Boulder—jason.dexter@colorado.edu
Dr. Keith Horne, University of St Andrews—kdh1@st-andrews.ac.uk
Dr. Erica Nelson, University of Colorado Boulder—erica.june.nelson@colorado.edu
Dr. Ric Davies, Max Planck Institute for Extraterrestrial Physics—davies@mpe.mpg.de