Patrick R. Behr

Laboratory for Atmospheric and Space Physics
University of Colorado, Boulder
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Education

University of Colorado, Boulder, CO

2025 *PhD*, Astrophysical and Planetary Sciences
Dissertation: Novel UV Investigations of Stars and their Planets

2022 *M.S.*, Astrophysical and Planetary Sciences

California State Polytechnic University, Pomona, CA

2020 *B.S.,* Physics with Astronomy Emphasis

Research

2025 **Research Scientist I,** Laboratory for Atmospheric and Space Physics

- Modeled terrestrial and hot-Jupiter atmospheres using observations from sounding rockets and space-based observatories
- Prepared instructional materials for X-ray and UV spectroscopy to onboard new graduate research assistants

2020-2025 **Graduate Research Assistant - Spaceflight Hardware**, University of Colorado Boulder

- Assembled, aligned, and tested spaceflight telescope and spectrograph hardware for the FLUID and SISTINE-3 sounding rocket missions
- Built and operated precision optical bench setups for instrument integration, alignment, and calibration
- Performed mechanical and optical integration in cleanroom and ultra-high-vacuum laboratory environments
- Designed and machined custom mechanical components and fixtures for instrument assembly, testing, and flight hardware
- Trained and supervised junior students in laboratory safety, instrument assembly, and alignment procedures

2020-2025 **Graduate Research Assistant - Exoplanetary Studies**, University of Colorado Boulder

- Analyzed far-UV, UV, and X-ray spectroscopic observations from space-based observatories including HST, Chandra, and XMM-Newton
- Developed and maintained python data pipelines for spectral extraction, calibration, and time-series analysis

	● Constructed stellar and planetary atmosphere spectra and performed model fitting and statistical uncertainty analysis
2019-2020	**Undergraduate Research Assistant**, Cal Poly Pomona Pomona ● Analyzed over 70 *Chandra* X-ray spectra of massive stars to search for stellar wind bow shocks ● Fit stellar X-ray spectra with models using the CIAO and XSPEC software
2019	**Undergraduate REU researcher**, Northern Arizona University ● Investigated the compaction of thin water ice films under high-energy electron bombardment using infrared reflectance spectroscopy ● Operated ultra-high vacuum and cryochamber equipment and cryogenically cooled detectors

Teaching

Summer 2024	**Instructor of Record**, University of Colorado, Boulder ● ASTR 1200—Stars and Galaxies for non-astronomy majors ● Served as instructor of record, responsible for course design, syllabus development, and alignment of learning objectives with departmental standards ● Delivered lectures and facilitated discussions, assessing student learning through exams, assignments, and projects ● Managed all aspects of the course, including grading, academic integrity, office hours, and student mentorship
Fall 2020	**Graduate Teaching Assistant**, University of Colorado Boulder ● ASTR 1030L—Accelerated Introductory Astronomy I Lab ● Delivered concept overview lectures and guided students through experiment assembly, data collection, and interpretation ● Managed and maintained laboratory supply inventory ● Assisted with grading, provided feedback on lab reports, and held regular open office hours
2015-2018	**Supplemental Instruction Leader**, Santiago Canyon College, Cal Poly Pomona ● Led peer-facilitated Supplemental Instruction sessions for Remedial Algebra, Calculus I & II, and Engineering Statics, emphasizing collaborative problem-solving ● Supported student success by integrating effective study strategies, exam preparation techniques, and conceptual review in a peer-led, active-learning environment

Publications

Refereed Papers

Patrick R. Behr, Kevin France, Nicholas Kruczek, Nicholas Nell, Brian Fleming, Stefan Ulrich, Girish M. Duvvuri, Amy Louca, Yamila Miguel (2025, in press), Investigating the High-energy Radiation Environment of Planets in Sun-like Binary Systems, *The Astronomical Journal*

Patrick R. Behr, Kevin France, Luca Fossati, Tommi Koskinen, Patricio E. Cubillos, Arika Egan, P. Wilson Cauley (2025), HST-COS Transit Spectroscopy of KELT-20b: First Detection of Excess Far-ultraviolet Absorption from an Ultrahot Jupiter, *The Astronomical Journal*, 170, 6

Patrick R. Behr, Kevin France, Alexander Brown, Girish M. Duvvuri, Jacob L. Bean, Zachory Berta-Thompson, Cynthia Froning, Yamila Miguel, Sebastian J. Pineda, David J. Wilson, Allison Youngblood (2023), The MUSCLES Extension for Atmospheric Transmission Spectroscopy, *The Astronomical Journal,* 166, 1

Patrick R. Behr, Patrick D. Tribbet, Tyler D. Robinson, Mark J. Loeffler (2020), Compaction of Porous H_2O Ice via Energetic Electrons, *The Astrophysical Journal*, 900, 2

Nicholas Nell, Kevin France, Nicholas Kruczek, Brian Fleming, Stefan Ulrich, **Patrick R. Behr**, Manuel A. Quijada, Javier Del Hoyo, John Hennessy (2024), The Assembly, Characterization, and Performance of SISTINE, *Journal of Astronomical Telescopes, Instruments, and Systems,* volume 10

Nicholas Nell, Nicholas Kruczek, Kevin France, Stefan Ulrich, **Patrick R. Behr**, Emily Farr (2024), Far- and Lyman-ultraviolet Imaging Demonstrator: A Rocket-borne Pathfinder Instrument for High Efficiency Ultraviolet Band Selection Imaging, *Journal of Astronomical Telescopes, Instruments, and Systems,* volume 10

Shreyas Vissapragada, Patrick McCreery, …, **Patrick R. Behr**, … et al. (2024), A High-resolution non-detection of Escaping Helium in the Ultrahot Neptune LTT 9779 b: Evidence for Weakened Evaporation, *The Astrophysical Journal Letters,* 962, 1

Fernando Cruz-Aguirre, Kevin France, Nicholas Kruczek, Brian Fleming, Parker C. Hinton, Stefan Ulrich, **Patrick R. Behr** (2023), The Radiation Environments of Middle-aged F-type Stars, *The Astrophysical Journal*, 956, 2

Shang-Min Tsai, Elspeth K. H. Lee, …, **Patrick R. Behr**, … et al. (2023), Photochemically Produced SO2 in the Atmosphere of WASP-39b, *Nature*, 617, 7961

Billy Edwards, Quentin Changeat, …, **Patrick R. Behr**, … et al. (2023), Characterizing a World Within the Hot-Neptune Desert: Transit Observations of LTT 9779 b with the Hubble Space Telescope/WFC3, *The Astronomical Journal*, 166, 4

Breanna Binder, Matthew S. Povich, **Patrick R. Behr** (2019), Searching for Faint X-Ray Emission from Galactic Stellar Wind Bow Shocks, *The Astronomical Journal*, 157, 5

Non-refereed Papers

Patrick R. Behr, Nicholas Nell, Nicholas E. Kruczek, Stefan Ulrich, Kevin France, Brian Fleming (2023), The SISTINE-3 Sounding Rocket Payload: Calibration and In-flight Performance, *Proceedings of the SPIE*, volume 12678

Nicholas Nell, Nicholas E. Kruczek, Kevin France, Stefan Ulrich, **Patrick R. Behr**, Emily Farr (2023), FLUID: A Rocket-borne Pathfinder Instrument for High Efficiency UV Band Selection Imaging, *Proceedings of the SPIE*, volume 12678

Invited Talks

2024	**Ultraviolet Spectroscopy of Exoplanet Host Stars: An Essential Tool for Characterizing Exoplanet Atmospheres** *Astronomy Colloquium*, University of Wyoming, Laramie, WY

Contributed Talks

2023	**The SISTINE-3 Sounding Rocket Payload: Science, Calibration, and In-flight Performance** *SPIE Optics + Photonics*, San Diego, CA
2023	**MUSCLES Extension for Atmospheric Transmission Spectroscopy: A Survey of Exoplanet Hosting Stars** *American Astronomical Society 241*, Seattle, WA