

Joseph D. Long

Research Interests

exoplanetary systems — high-contrast imaging and characterization — data-driven models

Education

- 2023 **Ph.D. in Astronomy & Astrophysics**, *University of Arizona*, Tucson, Arizona
Thesis: *Giant Exoplanets, Sirius, and Starlight Subtraction at Scale*. Advisor: Dr. Jared Males.
- 2020 **M.S. in Astronomy & Astrophysics**, *University of Arizona*, Tucson, Arizona
- 2014 **Bachelor of Arts in Physics**, *Pomona College*, Claremont, California

Employment

- 2023–present **Flatiron Software Research Fellow**, *Flatiron Institute Center for Computational Astrophysics*, New York City
Member of the Astronomical Data group working on problems of exoplanet and disk detection in high-contrast imaging data from extreme adaptive optics systems.
- 2017–2023 **Research Assistant**, *University of Arizona*, Tucson, Arizona
Worked with Dr. Jared Males and the Extreme Wavefront Control Lab to build MagAO-X, an extreme adaptive optics system. Performed research in high-contrast imaging.
- Fall 2022 **Teaching Assistant, Astronomy 418 & 518: Instrumentation**, *University of Arizona*, Tucson, Arizona
- Spring 2022 **Teaching Assistant, Astronomy 170: The Physical Universe**, *University of Arizona*, Tucson, Arizona
- 2015–2017 **Research & Instrument Analyst II**, *Space Telescope Science Institute*, Baltimore, Maryland
- 2014–2015 **Research & Instrument Analyst I**, *Space Telescope Science Institute*, Baltimore, Maryland
Worked with members of the STScI Telescopes Group on optical simulation software for NASA's James Webb Space Telescope (JWST) and Roman Space Telescope, JWST commissioning target selection, and other projects.
- Summer 2013 **hackNY Fellow**, *Datadog Inc. and hackNY.org*, New York, New York

Selected publications

Refereed publications

Joseph D. Long, Logan Pearce, Sebastiaan Y. Haffert, Jared R. Males, Laird M. Close, Olivier Guyon, Warren B. Foster, Kyle Van Gorkom, Alexander D. Hedglen, Maggie Y. Kautz, Jay K. Kueny, Jialin Li, Jennifer Lumbres, Eden A. McEwen, Avalon L. McLeod, and Lauren Schatz. Astrometric Calibration of MagAO-X with Updated Solutions for HD 165054 Field Stars. *AJ*, 169(1):36, January 2025.

Laird M. Close, Jared R. Males, Jialin Li, Sebastiaan Y. Haffert, **Joseph D. Long**, Alexander D. Hedglen, Alycia J. Weinberger, Katherine B. Follette, Daniel Apai, Rene Doyon, Warren Foster, Victor Gasho, Kyle Van Gorkom, Olivier Guyon, Maggie Y. Kautz, Jay Kueny, Jennifer Lumbres, Avalon McLeod, Eden McEwen, Clarissa Pavao, Logan Pearce, Laura Perez, Lauren Schatz, Judit Szulágyi, Kevin Wagner, and Ya-Lin Wu. Three Years of High-contrast Imaging of the PDS 70 b and c Exoplanets at H α with MagAO-X: Evidence of Strong Protoplanet H α Variability and Circumplanetary Dust. *AJ*, 169(1):35, January 2025.

R. Landman, S. Y. Haffert, J. R. Males, L. M. Close, W. B. Foster, K. Van Gorkom, O. Guyon, A. Hedglen, M. Kautz, J. K. Kueny, **J. D. Long**, J. Lumbres, E. A. McEwen, A. McLeod, and L. Schatz. Making the unmodulated Pyramid wavefront sensor smart. Closed-loop demonstration of neural network wavefront reconstruction with MagAO-X. *A&A*, 684:A114, April 2024.

Joseph D. Long, Jared R. Males, Sebastiaan Y. Haffert, Logan Pearce, Mark S. Marley, Katie M. Morzinski, Laird M. Close, Gilles P. P. L. Otten, Frans Snik, Matthew A. Kenworthy, Christoph U. Keller, Philip Hinz, John D. Monnier, Alycia Weinberger, and Volker Toll. Improved Companion Mass Limits for Sirius A with Thermal Infrared Coronagraphy Using a Vector-apodizing Phase Plate and Time-domain Starlight-subtraction Techniques. *AJ*, 165(5):216, May 2023.

S. Y. Haffert, J. R. Males, K. Ahn, K. Van Gorkom, O. Guyon, L. M. Close, **J. D. Long**, A. D. Hedglen, L. Schatz, M. Kautz, J. Lumbres, A. Rodack, J. M. Knight, and K. Miller. Implicit electric field conjugation: Data-driven focal plane control. *A&A*, 673:A28, May 2023.

Lauren Schatz, Johanan Codona, **Joseph D. Long**, Jared R. Males, Weslin Pullen, Jennifer Lumbres, Kyle Van Gorkom, Vincent Chambouleyron, Laird M. Close, Carlos Correia, Olivier Fauvarque, Thierry Fusco, Olivier Guyon, Michael Hart, Pierre Janin-Potiron, Robert Johnson, Nemanja Jovanovic, Mala Mateen, Jean-François Sauvage, and Benoit Neichel. Three-sided pyramid wavefront sensor, part II: preliminary demonstration on the new comprehensive adaptive optics and coronagraph test instrument testbed. *Journal of Astronomical Telescopes, Instruments, and Systems*, 8:049001, October 2022.

J. Nousiainen, C. Rajani, M. Kasper, T. Helin, S. Y. Haffert, C. Vérinaud, J. R. Males, K. Van Gorkom, L. M. Close, **J. D. Long**, A. D. Hedglen, O. Guyon, L. Schatz, M. Kautz, J. Lumbres, A. Rodack, J. M. Knight, and K. Miller. Toward on-sky adaptive optics control using reinforcement learning. Model-based policy optimization for adaptive optics. *A&A*, 664:A71, August 2022.

Logan A. Pearce, Jared R. Males, Alycia J. Weinberger, **Joseph D. Long**, Katie M. Morzinski, Laird M. Close, and Philip M. Hinz. Companion mass limits for 17 binary systems obtained with binary differential imaging and MagAO/Clio. *MNRAS*, 515(3):4487–4504, September 2022.

Alexander D. Hedglen, Laird M. Close, Sebastiaan Y. Haffert, Jared R. Males, Maggie Kautz, Antonin H. Bouchez, Richard Demers, Fernando Quirós-Pacheco, Breann N. Sitariski, Olivier Guyon, Kyle Van Gorkom, **Joseph D. Long**, Jennifer Lumbres, Lauren Schatz, Kelsey Miller, Alex Rodack, and Justin M. Knight. Lab tests of segment/petal

phasing with a pyramid wavefront sensor and a holographic dispersed fringe sensor in turbulence with the Giant Magellan Telescope high contrast adaptive optics phasing testbed. *Journal of Astronomical Telescopes, Instruments, and Systems*, 8:021515, April 2022.

Sebastiaan Y. Haffert, Laird M. Close, Alexander D. Hedglen, Jared R. Males, Maggie Kautz, Antonin H. Bouchez, Richard Demers, Fernando Quirós-Pacheco, Breann N. Sitariski, Kyle Van Gorkom, **Joseph D. Long**, Olivier Guyon, Lauren Schatz, Kelsey Miller, Jennifer Lumbres, Alex Rodack, and Justin M. Knight. Phasing the Giant Magellan Telescope with the holographic dispersed fringe sensor. *Journal of Astronomical Telescopes, Instruments, and Systems*, 8:021513, April 2022.

Lauren Schatz, Jared R. Males, Carlos Correia, Benoit Neichel, Vincent Chambouleyron, Johanan Codona, Olivier Fauvarque, Jean-François Sauvage, Thierry Fusco, Michael Hart, Pierre Janin-Potiron, Robert Johnson, **Joseph D. Long**, and Mala Mateen. Three-sided pyramid wavefront sensor, part 1: simulations and analysis for astronomical adaptive optics. *Journal of Astronomical Telescopes, Instruments, and Systems*, 7:049001, October 2021.

Kyle Van Gorkom, Jared R. Males, Laird M. Close, Jennifer Lumbres, Alex Hedglen, **Joseph D. Long**, Sebastiaan Y. Haffert, Olivier Guyon, Maggie Kautz, Lauren Schatz, Kelsey Miller, Alexander T. Rodack, Justin M. Knight, and Katie M. Morzinski. Characterizing deformable mirrors for the MagAO-X instrument. *Journal of Astronomical Telescopes, Instruments, and Systems*, 7:039001, July 2021.

Sebastiaan Y. Haffert, Jared R. Males, Laird M. Close, Kyle Van Gorkom, **Joseph D. Long**, Alexander D. Hedglen, Olivier Guyon, Lauren Schatz, Maggie Kautz, Jennifer Lumbres, Alex Rodack, Justin M. Knight, He Sun, and Kevin Fogarty. Data-driven subspace predictive control of adaptive optics for high-contrast imaging. *Journal of Astronomical Telescopes, Instruments, and Systems*, 7:029001, April 2021.

Joseph D. Long and Jared R. Males. Unlocking Starlight Subtraction in Full-data-rate Exoplanet Imaging by Efficiently Updating Karhunen-Loève Eigenimages. *AJ*, 161(4):166, April 2021.

Kevin Wagner, Katherine B. Follete, Laird M. Close, Dániel Apai, Aidan Gibbs, Miriam Keppler, André Müller, Thomas Henning, Markus Kasper, Ya-Lin Wu, **Joseph Long**, Jared Males, Katie Morzinski, and Melissa McClure. Magellan Adaptive Optics Imaging of PDS 70: Measuring the Mass Accretion Rate of a Young Giant Planet within a Gapped Disk. *ApJL*, 863(1):L8, August 2018.