# CLARISSA RIZZO CREDIDIO DO Ó

NSF Graduate Fellow and Physics Ph.D. Candidate, UC San Diego
(805) 837 - 9706 ⋄ cdoo@ucsd.edu ⋄ http://clarissardoo.github.io

## INTERESTS AND SKILLS

**Research:** Exoplanet Direct Imaging, Data Analysis, Instrumentation, Wavefront Sensing, Statistics, Hydrodynamic and N-body Simulations, Orbit Determination and Dynamics, Optics, Detector Characterization, Test Performance and Automation
**Outreach and Mentoring:** General public presentations, planetarium shows, research and career mentoring of undergraduate students

## EDUCATION

**University of California, San Diego** *09/2020 - Expected: 06/2025*
Physics, Ph.D.
**University of California, San Diego** *09/2020 - 02/2023*
Physics, M.S.
**University of California, Santa Barbara** *09/2016 - 06/2020*
Physics, B.S. (Honors) - Minor in Astronomy and Planetary Science

## RESEARCH AND WORK EXPERIENCE

**University of California, San Diego** September 2020 – Present
*Graduate Research Fellow (Advisor: Prof. Quinn Konopacky)* *San Diego, CA*

- Fit for the orbits of 20+ directly imaged systems including relative, absolute astrometry and radial velocities
- Analyzed the distribution of exoplanet eccentricities at a population level using Bayesian statistics and Monte Carlo methods.
- Characterized the EMCCD camera and aligned the telescope simulator for the pyramid wavefront sensor for the upgraded Gemini Planet Imager 2.0's (GPI 2.0)
- Integrated the pyramid wavefront sensor on GPI 2.0's optical bench
- Wrote a data reduction pipeline to reduce data from the NIRC2, a near-infrared camera on Keck Observatory
- Used fiber-fed high resolution spectroscopy to understand the orbital parameters and atmosphere of a directly imaged system
- Simulated on a supercomputing facility the hydrodynamics, dynamics and stability of several protoplanetary disks and exoplanet systems to understand planet formation and evolution

**Lockheed Martin** January 2020 – September 2020
*Test Engineer Intern* *Santa Barbara, CA*

- Tested infrared focal plane arrays (FPAs) using a series of procedures (e.g. operating a dewar).

· Used objected-oriented programming to automate the testing process of infrared FPAs and used these scripts to test parts

**NASA Jet Propulsion Laboratory** June 2019 – September 2019
*Astrophysics Research Intern (Mentor: Dr. Gautam Vasisht)* *Pasadena, CA*

· Worked on the Palomar Radial Velocity Instrument, a near-infrared high-resolution spectrograph.
· Wrote programs to predict the instrument's photon throughput, and performed photometry and spectrophotometry on data to compare my projections to the actual throughput
· Performed simulations to analyze how the single-mode fiber optics coupling efficiency changes as we introduce optical aberrations into the system.

**University of California, Santa Barbara** June 2018 – June 2020
*Undergraduate Researcher (Advisor: Prof. Ben Mazin)* *Santa Barbara, CA*

· Designed and developed a database for the Mazin Lab, an astrophysics laboratory that uses Microwave Kinetic Inductance Technology to directly image extrasolar planets. The database is a website currently available on the laboratory's server
· Wrote a program that corrected cosmic ray incidents for the new device developed by the lab (MEC - MKID Exoplanet Camera).
· Performed post-processing (angular differential imaging and spectral differential imaging) and made contrast curves on MEC data.

## AWARDS, GRANTS AND HONORS

ExoPAG 31 Travel Grant (November 2024)

SPIE Astronomical Telescopes+Instrumentation Travel Grant (April 2024)

Carol and George Lattimer Award for Graduate Excellence (February 2023)

NASA ExoExplorers Award (January 2023)

The School of Physical Sciences Cohort Program Mentorship Award at UCSD (September 2022)

National Science Foundation Graduate Research Fellowship (NSF GRFP) (March 2020)

San Diego Fellowship (March 2020)

Physics Excellence Award (January 2020)

Caltech SURF (Summer Undergraduate Research Fellowship) (June 2019)

Edison GRE Scholarship (May 2019)

Edison Summer Research Program Scholarship (June 2018)

Starting Lines Essay Publication Prize at UCSB (January 2018)

## PUBLICATIONS

**First Author:**

**Clarissa R. Do Ó**, Ben Sappey, Quinn M. Konopacky, et al. "Orbital and Atmospheric Characterization of the 1RXS J034231.8+121622 System Using High-Resolution Spectroscopy Confirms That The Companion is a Low-Mass Star", The Astronomical Journal, Volume 167, Issue 6, id.278, 24 pp. (2024)

**Clarissa R. Do Ó**, Kelly K. O'Neil, Quinn M. Konopacky, et al. "The Orbital Eccentricities of Directly Imaged Companions Using Observable-Based Priors: Implications for Population-level Distributions", The Astronomical Journal, Volume 166, Issue 2, id.48, 22 pp. (2023)

**Clarissa R. Do Ó**, Saavidra Perera, Jêrome Máire, et al. "GPI 2.0: GPI 2.0: Exploring The Impact of Different Readout Modes on the Wavefront Sensor's EMCCD", Proc. SPIE 13097, Volume 13097, Adaptive Optics Systems IX; 1309742 (2024)

**Clarissa R. Do Ó**, Saavidra Perera, Jêrome Máire, et al. "GPI 2.0: performance evaluation of the wavefront sensor's EMCCD", Adaptive Optics for Extremely Large Telescopes 7th Edition, ONERA, Jun 2023, Avignon, France. ⟨10.13009/AO4ELT7-2023-045⟩. ⟨hal-04419969⟩ (2023)

**In Preparation:**

**Clarissa R. Do Ó**, Jaehan Bae, Quinn M. Konopacky, et al. "The PDS 70 Protoplanets After Disk Dissipation: Implications for Gas Giant Formation, Orbital Evolution and Stability"

**Clarissa R. Do Ó**, Quinn M. Konopacky, Tuan Do, et al. "The Constraining Power of Extreme Precision Relative Radial Velocities in the Orbit Fitting of Directly Imaged Companions"

**Significant Contributions:**

Saavidra Perera, Jerome Maire, **Clarissa Do Ó**, et al. "GPI 2.0: pre-integrated pyramid wavefront sensor results", Proc. SPIE 13097, Adaptive Optics Systems IX, 130971S (2024)

Ben Sappey, Quinn M. Konopacky, **Clarissa R. Do Ó**, et al. "HD 206893 B at High Spectral Resolution using KPIC/NIRSPEC", accepted to AJ (2025)

William Thompson, Christian Marois, **Clarissa R. Do Ó**, et al. "Deep orbital search for additional planets in the HR 8799 system", The Astronomical Journal, Volume 165, Issue 1, id.29, 20 pp. (2023)

Saavidra Perera, Jeffrey Chilcote, Quinn M. Konopacky, et al. (including **Clarissa Do Ó**), et al. "Upgrading the Gemini planet imager to GPI 2.0", Proceedings of the SPIE 12680, Techniques and Instrumentation for Detection of Exoplanets XI, 1268001 (2023)

Saavidra Perera, Jêrome Máire, **Clarissa R. Do Ó**, et al. "GPI 2.0: Pyramid Wavefront Sensor Status", Proceedings of the SPIE, Volume 12185, id. 121854C 7 pp. (2022)

Eckhart Spalding, **Clarissa Do Ó**, Dillon Peng, et al. "GPI 2.0: Baseline testing of the Gemini Planet Imager before the upgrade", Proceedings of the SPIE, Volume 12184, id. 1218448 11 pp. (2022)

**N-th Author:**

Chih-Chun Hsu, Jason J. Wang, et al. (including **Clarissa R. Do Ó**). "Detection and Characterization of PDS 70 b from Keck/KPIC High-resolution Spectroscopy", Submitted to ApJL (2024)

Jeffrey Chilcote, Quinn M. Konopacky, et al. (including **Clarissa Do Ó**). "GPI 2.0: upgrade status of the Gemini Planet Imager", Proc. SPIE 13096, Ground-based and Airborne Instrumentation for Astronomy X, 1309699 (2024)

Sarah Blunt, Jason J. Wang, et al. (including **Clarissa Do Ó**). "orbitize! v3: Orbit fitting for the High-contrast Imaging Community", accepted to the Journal of Open Source Software (2024)

Katelyn Horstman, Jean-Baptiste Ruffio, et al. (including **Clarissa R. Do Ó**). "RV measurements of directly imaged brown dwarf GQ Lup B to search for satellites", The Astronomical Journal, Volume 168, Issue 4, id.175, 10 pp. (2024)

Jerry W. Xuan, Jason Wang, et al. (including **Clarissa R. Do Ó**). "Validation of Elemental and Isotopic Abundances in Late-M Spectral Types with the Benchmark HIP 55507 AB System", The Astrophysical Journal, Volume 962, Issue 1, id.10, 21 pp. (2024)

Yapeng Zhang, Jerry Xuan, et al. (including **Clarissa Do Ó**). "Atmospheric Characterization of the Super-Jupiter HIP 99770 b with KPIC", The Astronomical Journal, Volume 168, Issue 3, id.131, 14 pp. (2024)

Dillon Peng, Jeffrey Chilcote, et al. (including **Clarissa Do Ó**). "GPI 2.0: Testing and Performance of IFS Upgrades for GPI 2.0", Proceedings of the SPIE, Volume 12680, id. 126801Y 8 pp. (2023)

Dillon Peng, Maeve Curliss, et al. (including **Clarissa Do Ó**). "GPI 2.0: performance of upgrades to the Gemini Planet Imager CAL and IFS", Proceedings of the SPIE, Volume 12184, id. 1218443 9 pp. (2022)

Jeffrey Chilcote, Quinn M. Konopacky, et al. (including **Clarissa Do Ó**). "GPI 2.0: upgrade status of the Gemini Planet Imager", Proceedings of the SPIE, Volume 12184, id. 121841T 15 pp. (2022)

Katie A. Crotts, Brenda C. Matthews, et al. (including **Clarissa R. Do Ó**). "A Uniform Analysis of Debris Disks with the Gemini Planet Imager. I. An Empirical Search for Perturbations from Planetary Companions in Polarized Light Images", The Astrophysical Journal, Volume 961, Issue 2, id.245, 35 pp. (2024)

William Thompson, Jensen Lawrence, et al. (including **Clarissa R. Do Ó**). "Octofitter: Fast, Flexible, and Accurate Orbit Modeling to Detect Exoplanets", The Astronomical Journal, Volume 166, Issue 4, id.164, 20 pp. (2023)

Anne-Lise Marie, Laetitia Derez, et al. (including **Clarissa Do Ó**). "Workshop Summary: Exoplanet Orbits and Dynamics", Publications of the Astronomical Society of the Pacific, Volume 135, Issue 1052, id.106001, 17 pp. (2023)

Yinzi Xin, Jerry W. Xuan, et al. (including **Clarissa Do Ó**). "On-sky speckle nulling through a single-mode fiber with the Keck Planet Imager and Characterizer", July 2023, Journal of Astronomical Telescopes, Instruments, and Systems, Volume 9, id. 035001 (2023).

## PROGRAMMING SKILLS

- **Intermediate:** Unix, Git
- **Basic:** C/C++ (including OpenMP, Efit5/MultiNest, FARGO3D, Dusty FARGO), HTML/JavaScript

## OBSERVING EXPERIENCE AND MEMBERSHIP

Gemini Planet Imager 2.0 Science and Instrument Team Member (2020 - )

Keck/KPIC Science Team Member (2023 - )

W.M. Keck Observatory - KPIC (NIR High Resolution Spectroscopy), 3 Nights (2023 - 2024)

W.M. Keck Observatory - NIRC2 (NIR Imaging), 6 Nights (2021 - 2023)

Palomar Observatory - PARVI (NIR High Resolution Spectroscopy), 6 Nights (2019)

Subaru/MEC Data Reduction Pipeline Member (2018-2019)

## TEACHING, SERVICE AND OUTREACH

**STARTastro Mentoring Program** July 2024 – Present
*Mentor* *San Diego, CA*

· Mentored a community college transfer student on an independent research project
· Taught the student how to reduce data from the Keck/NIRC2 telescope in order to fit for the orbit of a directly imaged companion
· Co-mentoring the student on Keck/OSIRIS data reduction of the companion

**NYRIA Workshop 2024** December 2023 – Present
*Local Organizing Committee Member* *San Diego, CA*

· Wrote funding proposals for local and national funding agencies to host an early-career instrumentation workshop at UC San Diego
· Participated in the organizing of lodging, transportation and schedule for the workshop
· Led the organization and invitations of the workshop's career panel

**Cosmic Tours** May 2022 – Present
*Co-Organizer and Volunteer* *San Diego, CA*

· The UCSD Cosmic Tours are short planetarium shows given on a portable planetarium for K-12 schools and other outreach events.
· Set up, ran and operated a portable planetarium for outreach shows in the San Diego area.
· Engaged with the local school community in order to organize the planetarium schedule.

**Physics Identity Program** September 2024 – Present
*Mentor* *San Diego, CA*

· Guided local physics students on graduate school and internship applications.

**Astrobites** January 2022 – December 2023
*Author* *Online Website*

· Wrote summaries of astro-ph papers from the arXiv and outreach articles for astrobites.org, funded by AAS
· Translated posts to Astropontos, Astrobites' sister website in Portuguese.

**Cool Stars 22** June 2024
*Local Organizing Committee Member* *San Diego, CA*

· Volunteered for a variety of tasks during Cool Stars 22 (e.g. A/V assist, headcounts for excursions, front desk organization)

**Cohort Mentoring Program at UCSD** September 2022 – June 2023
*Mentor* *San Diego, CA*

· Tutored UCSD undergraduate students in their homework and school work.
· Guided students on graduate school and internship applications.

**Physics 164 (Observational Astrophysics Lab at UCSD)** January – March 2022
*Teaching Assistant* *San Diego, CA*

· Taught Students how to analyze astronomical data in Python.
· Operated and observed with the Lick Observatory's Nickel Telescope

## PRESENTATIONS

**Invited Talks:**

"The Pathway to Imaging Entire Exoplanet Systems" - Caltech (November 2024, Los Angeles, CA)

"Imaging Other Solar Systems!" - San Diego Comic Fest (October 2024, San Diego, CA)

"Constraining the Formation of Directly Imaged Exoplanets Using Orbit Fitting Techniques" - Stanford KIPAC Tea Talks (October 2024, Palo Alto, CA)

"Constraining the Formation of Directly Imaged Exoplanets Using Instrumentation and Orbit Fitting Techniques" - UCLA Lunch Seminar Series (April 2024, Los Angeles, CA)

"Constraining the Formation of Directly Imaged Exoplanets Using Instrumentation and Orbit Fitting Techniques" - NASA Jet Propulsion Laboratory Lunch Seminars (April 2024, Pasadena, CA)

"Constraining the Formation of Directly Imaged Exoplanets Using Instrumentation and Orbit Fitting Techniques" - Space Telescope Science Institute ESPF Seminar (October 2023, Baltimore, MD)

"Constraining the Formation of Directly Imaged Exoplanets Using Instrumentation and Orbit Fitting Techniques" - NASA Ames Research Center Seminar (May 2023, Santa Clara, CA)

"At the Edge of Chaos: The Dynamics of Directly Imaged Exoplanet Systems" - iTelescope Webinar (May 2023, Online)

**Contributed Talks:**

"Constraining the Formation and Orbital Architectures of Directly Imaged Exoplanets" - American Astronomical Society Meeting 245 (January 2025, National Harbor, MD)

"Constraining the Formation and Orbital Architectures of Directly Imaged Exoplanets" - ExoPAG 31 (January 2025, National Harbor, MD)

"The Orbital Eccentricities of Directly Imaged Exoplanets using Observable-based Priors" - Brazilian Colloquium on Orbital Dynamics (December 2024, São José dos Campos, Brazil)

"Constraining the Formation of Directly Imaged Exoplanets by Upgrading the Gemini Planet Imager (GPI)'s Wavefront Sensor" - NASA ExoExplorers Talks (April 2023, Online)

"Upgrading the Gemini Planet Imager 2.0's Wavefront Sensor" - NYRIA Workshop (November 2022, Sarcedo, Italy)

"The Palomar Radial Velocity Instrument's commissioning" - NASA JPL Intern Talks (July 2019, Pasadena, CA)

**Posters:**

"Orbital and Atmospheric Characterization of the 1RXS J034231.8+121622 System Using High-Resolution Spectroscopy Confirms That The Companion is a Low-Mass Star"" - Cool Stars 22 (June 2024, San Diego, CA)

"GPI 2.0: GPI 2.0: Exploring The Impact of Different Readout Modes on the Wavefront Sensor's EMCCD" - SPIE Astronomical Telescopes+Instrumentation (June 2024, Yokohama, Japan)

"The Orbital Eccentricities of Directly Imaged Companions Using Observable-Based Priors: Implications for Population-level Distributions" - Keck Science Meeting (September 2023, Berkeley, CA)

"GPI 2.0: performance evaluation of the wavefront sensor's EMCCD" - AO4ELT Conference (June 2023, Avignon, France)

"The Orbital Eccentricities of Directly Imaged Companions Using Observable-Based Priors: Implications for Population-level Distributions" - Keck Science Meeting (September 2022, Pasadena, CA)

"GPI 2.0: performance evaluation of the wavefront sensor's EMCCD" - SPIE Astronomical Telescopes & Instrumentation (July 2022, Montreal, Canada)

"The Orbital Eccentricities of Directly Imaged Companions Using Observable-Based Priors: Implications for Population-level Distributions" - Spirit of Lyot Conference (June 2022, Leiden, Netherlands)

"A Database for the Stars Observed by the Mazin Lab using MKID Technology" - APS' Conference for Undergraduate Women in Physics (January 2019, Santa Barbara, CA)

"A Database for the Stars Observed by the Mazin Lab using MKID Technology" - UCSB Undergraduate Research Colloquium (August 2018, Santa Barbara, CA)