Arcelia Hermosillo Ruiz

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Education

University of California, Santa Cruz

(Jun. 2025) PhD Astronomy and Astrophysics; (Aug. 2022) M.S. Astronomy and Astrophysics

University of California Berkeley

(Dec. 2018) B.A. Physics & Astrophysics

Research Experience

Postdoctoral Research Fellow, University of Exeter, UK *Oct 2025 - present*

Debris Disk Modeling

- Advisor: Dr. Sebastian Marino
  I model planet-disk interactions in extrasolar debris disk systems.

Graduate Student Researcher, University of California Santa Cruz *Sept. 2019 - 2025*

Constraining Migration Processes in the Outer Solar System and Planet Architecture in Debris Disks

- Advisor: Prof. Ruth Murray-Clay
  I explore how the outer Solar System has evolved.By comparing nbody simulations with observations, we get closer to constraining how the planets' orbits changed over the last 4 billion years because of how they gravitationally interact with planetesimals which make up today's Kuiper Belt. I also run simulations to understand how planets dynamically excite debris around other stars to understand observations from HST, ALMA, JWST and more.

Undergraduate Researcher, University of California Berkeley *May 2016 - May 2020*

Thermalization Effects In Late-Time Type Ia Supernova Light Curves

- Advisors : Prof. Daniel Kasen & Dr. Jennifer Barnes
  Explored the discrepancy of "twin" Supernovae (SNe) lightcurves several hundred days after explosion. Simulated how radioactive isotopes and magnetic fields affect heating in the ejecta using Python and C++.

Undergraduate Researcher, INFN-Padova, Italy *Summer 2018*

b-Jet and c-Jet Identificaton at LHCb Using Deep Learning Techniques

- Advisors: Prof. Donatella Lucchesi & Dr. Lorenzo Sestini & Dr. Alessio Gianelle
  I improved a deep learning algorithm identifying subatomic particles from the Large Hadron Collider beauty (LHCb) experiment at CERN. I accomplished this by analyzing newly simulated data with recent LHCb conditions and assessing which observables and configurations would improve the performance of the algorithm.

Undergraduate Researcher, Banneker Institute–Harvard | Smithsonian *Summer 2017*

Identifying M Dwarfs and their Stellar Companions

- Advisor: Dr. Jennifer Winters
  I studied the environment of M dwarf stars to assess the number of close-orbit stellar companions. By translating an existing IDL program to python, I cross checked two data sets to find distances and colors of the stars. From the 800 images, I discovered 10 new binary candidates.

Publications

First Author and Lead Mentor

Arcelia Hermosillo Ruiz, Ruth Murray-Clay, Meredith MacGregor, *Nbody Simulations of an Inclined, Eccentric Planet and Exterior Debris Disk Show Asymmetric Structure Similar to AU Mic*, to be summited to ApJ soon

Arcelia Hermosillo Ruiz, Kathryn Volk, Ruth Murray-Clay, Rosemary Pike, *Forcing Planets to Evolve: The Relationship Between Uranus and Neptune at Late Stages of Dynamical Evolution*, submitted to ApJ, in review `https://doi.org/10.48550/arXiv.2410.11813`

Arcelia Hermosillo Ruiz, Harriet C.P Lau, Ruth Murray-Clay, *Randomness and Retention: Using Weak Resonances to Constrain Neptune's Late-Stage Migration*, MNRAS, 05/24, `https://doi.org/10.1093/mnras/stae1246`

Sricharan Balaji, Nihaal. Zaveri, Nenae Hayashi, Arcelia Hermosillo Ruiz, Jackson Barnes, Ruth Murray-Clay, Kathryn Volk, Jake Gerhardt, and Zain Syed, *Can the 3:2 mean motion resonance orbital distribution result from stability sculpting*, MNRAS, 07/23, `https://doi.org/10.1093/mnras/stad2026`

Co-Author

Rosemary E. Pike, et. al., L*i*DO: Discovery of a 10:1 Resonator with a Novel Libration State, in review

Kathryn Volk, Arcelia Hermosillo Ruiz, Ruth Murray-Clay, Rosemary E Pike, How variations in giant planet migration simulations affect predicted resonant transneptunian populations, in prep

Rosemary E. Pike et. al., Resonant TNO Surface Colors: Constraints on TNO Formation and Evolution, in prep

Maissa Salama et. al., *An Adaptive Optics Census of Companions to Northern Stars Within 25 pc with Robo-AO*, ApJ, 04/22, `https://doi.org/10.3847/1538-3881/ac53fc`

Research Mentorship

(2019-2022) , **Sricharan Balaji, Nihaal Zaveri**, UCSC undergraduate students co-advised with Prof. Ruth Murray-Clay

(2023-2025) , **Katrina Kianpoor**, UCSC undergraduate student co-advised with Prof. Ruth Murray-Clay

Presentations

Invited Talk

12/24	**Constraining Dynamical Processes in the Solar System and AU Mic Debris Disk**, Space Telescope Science Institute, Exoplanet Seminar	
12/24	**Constraining Dynamical Processes in the Solar System and AU Mic Debris Disk**, UC Berkeley, CIPS Seminar	
11/24	**Constraining Dynamical Processes in the Solar System and AU Mic Debris Disk**, CU Boulder, Friday Lunch Seminar	
03/22	**Investigating how eccentric, inclined planets scatter planetesimal debris in and outside of our solar system**, Yale Stars and Exoplanets Seminar, Virtual	

Conference

10/24	**Using Surface Colors of Resonant TNOs to Probe Neptune's Migration History With Well-Controlled Planetary Evolution Simulations**, Division of Planetary Science, Virtual	*talk*
07/24	**Reproducing Vertical Asymmetric Structure Similar to the AU Mic Debris Disk with an Inclined, Eccentric Planet**, OWL Summer School, Santa Cruz, CA	*talk*
07/24	**Forcing Planets to Evolve: How Damping Neptune's Eccentricity can Indirectly Affect the Orbit of Uranus**, REBOUND 2024, virtual	*talk*
06/24	**Using Surface Colors of Resonant TNOs to Probe Neptune's Migration History With Well-Controlled Planetary Evolution Simulations**, Trans Neptunian Objects, Taipei City Taiwan	*talk*
05/24	**Forcing Planets to Evolve: Uranus' Eccentricity Damping Could be Linked to Neptune**, Division of Dynamical Astronomy, Toronto Candada,	*talk*
03/24	**Nbody Simulations of an Inclined, Eccentric Planet and Exterior Debris Disk Show Asymmetric Structure Similar to AU Mic**, Dust Devils, Tucson Arizona	*talk*
03/24	**Nbody Simulations of an Inclined, Eccentric Planet and Exterior Debris Disk Show Asymmetric Structure Similar to the AU Mic Debris Disk**, Extreme Solar Systems, Christchurch New, Zealand	*poster*
09/23	**Investigating a Gravitational Upheaval Through Studying the Kuiper Belt**, Bay Area Planetary Science Conference, Santa Cruz, Ca	*talk*
06/23	**Investigating how eccentric, inclined planets affect planetesimal debris around young stars**, GRC: Origins of Solar Systems, South Hadley, MA	*poster*
04/22	**Constraints on Migration Scenarios of Neptune due to Stochasticity in Planetesimal-Driven Migration**, Division of Dynamical Astronomy, New York, NY	*talk*
05/21	**Impact of Stochastic Migration on Weak Resonances in the Kuiper Belt**, Division of Dynamical Astronomy, Virtual	*talk*

Teaching and Science Communication

Hispanic Club Youth Leadership Council, Invited Speaker	*October 2024*
MESA Day, Keynote Speaker	*March 2024*
ASTR 9—Introduction to Astronomy Research, Guest Lecturer (3)	*Winter 2023*
UCSC Astronomy on Tap, Invited Speaker	*April 2023*

San Francisco State Planetarium—Noche de Estrellas, Invited Speaker — *March 2023*
ASTR 19—Practical Programming for the Sciences, Teacher Assistant — *Spring 2022*
LAMAT Summer Institute—UCSC Summer Research Program, Python Instructor — *Summer 2021*
ASTR 3—Introductory Astronomy: Planetary Systems, Teacher Assistant — *Spring 2020*
ASTR 6—The Space Age Solar System, Teacher Assistant — *Winter 2020*
Lawrence Hall of Science Planetarium, Presenter — *2016-2019*
HES Winter Academic Training Camp, Calculus Instructor — *January 2016*
DaVinci Camp Summer Institute, Physics Instructor and Teacher Assistant — *Summer 2015*

Selected Service and Outreach

Division of Dynamical Astronomer DEI Committee, Member — *2024-*
UCSC Astro Grad Mentoring Program, Mentor — *2022-*
Astrophysics Division of the Science Mission Directorate for NASA, IDEA practitioner — *2022-*
Various Programs, panelist for events intended for first gen/low income/underrepresented students — *2020-*
Various Programs, mentor to 2-3 students per year — *2015-*
NASA Panel Review, executive secretary — *2024*
UCSC/MESA Astronomy Outreach Event, lead organizer — *Mar. 2024*
NASA Panel Review, executive secretary — *2023*
Women of Color Graduate CommUNITY Group, Coordinator — *2022-2024*
UC Santa Cruz Astronomy and Astrophysics, Grad Student Liaison—Meeting Organizer — *2021-2022*
UCSC Noche de las Estrellas, Volunteer — *Oct. 2021*
UCSC Graduate Student Association, Astronomy and Astrophysics Graduate Student Representative — *2020-2021*
Hispanic Engineers and Scientists, Secretary (2 years) and President (1 year) — *2016-2019*
RAICES Center, Co-Lead for Spring Break Higher Education Outreach — *2015-2017*

Awards

2025 **NSF MPS Ascend Postdoc Fellowship (declined)**,
2025 **Elaine P. Snowdon Postdoc Fellowship at University of Canterbury, NZ (declined)**,
2019-23 **NSF Graduate Research Fellowship**,
2021 **LSSTC Data Science Fellowship** ,
2021 **Division of Dynamical Astronomy Duncombe Student Research Prize**,
2020 **Outstanding Graduate Student Mentor Award**,
2019 **Honorable Mention—Ford Foundation Predoctoral Fellowship**,
2019 **University of Washington Graduate Opportunities and Minority Achievement Program (not accepted)**,
2017-18 **Bergeron Women in STEM Leadership Scholar**,
2017-18 **NSF CAMP (LSAMP) Scholar**,
2018 **Honorable Mention—NSF CAMP Symposium Presentation Competition**,
2016,17 **Undergraduate Poster Presentation Award, SACNAS Conference**,
2018 **Hispanic Scholarship Fund Recipient**,
2014-18 **Berkeley Science Network S-STEM Scholar**,