

DIANA SOLANO - OROPEZA

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Education

Cornell University

Ithaca, NY

Ph.D in Astronomy

Aug 2023 - Present

- Concentrations: Astrostatistics, Astrobiology, Exoplanets
- Coursework: Exoplanet Characterization, Physics of the Planets, Planetary Atmospheres, Galactic Structure and Stellar Dynamics, Physics of Stars, Neutron Stars, and Black Holes (Fall 2024), Inverse Methods in the Natural Sciences (Fall 2024)

Columbia University

New York, NY

Post-Baccalaureate Studies in Astronomy and Astrophysics

Sept 2021 - Aug 2023

- Coursework: Electricity and Magnetism (Undergraduate), Research Seminar I/II (Graduate), Astrostatistics (Graduate)

Drexel University

Philadelphia, PA

B.S. in Physics, Concentration in Astrophysics | Minor in Sociology

Sept 2016 – June 2021

- Senior Thesis: "Unmixing a Document: Resonance and Language Generation" advised by Dr. Jake Ryland Williams
- Relevant Coursework: Observational Astrophysics, Galactic Astrophysics, Cosmology, Computational Physics I and II, Big Data Physics, Statistical Mechanics, Thermodynamics, Calculus I and II, Multivariate Calculus, Complex and Vector Analysis, Differential Equations

Bronx High School of Science

Bronx, NY

High School Diploma with Advanced Designation

Sept 2012 – June 2016

Honors and Awards

Cornell Dean's Excellence Fellowship

Mar 2023

National Science Foundation Graduate Research Fellowship

Mar 2023

AAS 241st Meeting FAMOUS Travel Grant

Nov 2022

AAS Committee on the Status of Minorities Micro-Grant

Nov 2022

Dean's List

Fall 2020, Winter – Spring 2021

A.J. Drexel Scholarship

Fall 2016 – 2020

STAR Scholar

Summer 2017

3rd Place Presentation in Physical Sciences, Greater Philadelphia AMP Conference

Oct 2017

New York City Council Certificate of Recognition

Aug 2016

Research Experience

Astronomy Graduate Research Fellow

Ithaca, NY

Carl Sagan Institute

Sept 2023 – Present

- Expand known stars that may see Earth transit the Sun within the past and future 500,000 years using Gaia satellite data, advised by Dr. Lisa Kaltenegger at the Carl Sagan Institute (CSI) and Dr. Jackie Faherty at the American Museum of Natural History
- Examine the light curves of ultra-hot Jupiter targets monitored by TESS for potential signs of transit timing variations (TTVs) and orbital decay, supervised by Dr. Jake Turner at CSI

Astrophysics Research Assistant

New York, NY

Columbia Astrophysics Labs

Sept 2021 – Aug 2023

- Led exoplanetary science research project, advised by Dr. David Kipping in Cool Worlds Lab in Columbia Dept of Astronomy

- Led and trained team of 3 undergraduates, assisted by graduate student Daniel Yahalomi, in labeling light curve data needed to estimate eccentricity
- Estimated eccentricity for approx. 1000 exoplanets orbiting late M stars using TESS transit data, without the need for radial velocity data, using Bayesian statistics
- Produced catalog of eccentricity data to be made available to the general public, computed using NASA Pleiades supercomputer

Applied Physics Research Assistant

Philadelphia, PA

Drexel University College of Computing and Informatics

Sept 2020 – June 2021

- Culminated in senior physics thesis "Unmixing a Document - Resonance and Language Generation", advised by Dr. Jake Ryland Williams
- Stochastic language modeling with aim of demonstrating key physical mechanisms behind human-generated written language
- Verified proposed mechanisms by analyzing data obtained by counting up words in Project Gutenberg corpus, as well as examining applications in quantitative social sciences and machine learning

Data Analyst

Philadelphia, PA

Drexel University College of Computing and Informatics

Aug 2020 – Aug 2021

- NSF REU Supplement Award Number 1850014, supervised by Dr. Jake Ryland Williams
- Studied online human discourse with aim of providing moderation tool against ad hominem attacks in social media
- Stochastic language modeling combined with software development
- Annotated and processed about 500 social media threads for preparation in machine learning tasks

Applied Physics Research Assistant

Philadelphia, PA

Drexel University College of Computing and Informatics

April 2020 – Sept 2020

- Remote co-op funded by Drexel's Alliance for Minority Participation program, supervised by Dr. Jake Ryland Williams
- Studied and supported collaborative projects on stochastic language modeling
- Developed visualizations of probabilistic models and data clusters based on Project Gutenberg corpus composed of 1000 documents after running numerical experiments on cluster computer
- Resulted in preprint paper posted on arXiv

Astrophysics Research Assistant

Philadelphia, PA

Drexel University Department of Physics

June 2017 – Sept 2017

- Part of STAR (Scholars Tackling Advanced Research) summer undergraduate program at Drexel
- Produced mock observations of simulated star formation under supervision of Dr. Stephen McMillan
- Streamlined the process of graphical simulation image production initially developed by graduate student Joshua Wall
- Presented at the Oct 2017 Greater Philadelphia AMP Conference and won 3rd Place in Physical Sciences

Astrophysics Research Assistant

New York, NY

American Museum of Natural History

Sept 2015 – June 2016

- Part of Science Research Mentoring Program
- Studied dynamics of chaotic binary star system interactions under supervision of museum astrophysicist Dr. Nathan Leigh
- Developed plots of system orbits and virial ratios using Supermongo
- Published a paper in the *Monthly Notices of the Royal Astronomical Society*

Teaching Experience

Special Events and Exhibition Hall Educator

Academy of Natural Sciences

Philadelphia, PA
Oct 2019 – Mar 2020

- Educated visitors on issues and discoveries in the natural sciences using the seasonally rotating special exhibition as a launchpad
- Communicated science concepts such as evolution and the prevalence of living dinosaurs today to museum patrons of all ages at special events using live demonstrations
- Created several public outreach activities such as biodiversity-demonstrating scavenger hunts and collaborated with museum staff to manage events

Student STEM Middle School Teaching Assistant

Drexel University

Philadelphia, PA
Jan 2019 – Mar 2019

- Part of DragonsTeach Step One course offered at Drexel
- Created and taught several lessons pertaining to math topics such as geometry and probability at Masterman School
- Collaborated with fellow teaching student on teaching and managing classroom activities during lessons using research-based education techniques

Student Elementary School Science Club Teaching Assistant

Drexel University

Philadelphia, PA
Jan 2018 – Mar 2018

- Part of Connections in Physics course offered at Drexel
- Collaborated with fellow physics students to manage and run an after-school science club at Alaine Locke School
- Created enrichment lessons that focused on physics topics appropriate for an elementary school audience

Publications

The chaotic four-body problem in Newtonian gravity I: Identical point particles. —Leigh, N.W.C., Stone, N.C., Geller, A.M., Shara, M.M., Thomas, Y., Solano-Oropeza, D., Muddu, H. (2016) *The Monthly Notices of The Royal Astronomical Society*. doi: 101093/mnras/stw2178.

Manuscripts In Review

M-Dwarf Exoplanets With Similar Sizes and Instellations to Earth Typically Follow Near-Circular Orbits. —Kipping, D., Solano-Oropeza, D., Yahalomi, D., Poddar, A., Li, M., Zhang, A. (2023) Submitted to *Nature*.

Posters

Who Watches the Watchmen? Exploring the ETZ with Gaia DR3 —Solano-Oropeza, D., Kaltenegger, L., Faherty, J. (2024) *Astrobiology Graduate Conference (AbGradCon) 2024*.

Probing the Eccentricities for Long-Period Planetary Candidates Orbiting Low-Mass Stars Observed by TESS —Solano-Oropeza, D., Kipping, D., Yahalomi, D., Poddar, A., Li, M., Zhang, A. (2023) *Columbia University Pathways Program Symposium 2023*.

TESS, M-Dwarfs, and the Photoeccentric Effect: A Loophole in Transit —Solano-Oropeza, D., Kipping, D., Yahalomi, D., Poddar, A., Li, M., Zhang, A. (2023) *AAS 241st Annual Meeting of the American Astronomical Society*.

Estimating Eccentricity for M-Dwarfs without Radial Velocity —Solano-Oropeza, D., Kipping, D., Yahalomi, D., Poddar, A., Li, M., Zhang, A. (2022) *2022 Sagan Exoplanet Summer Hybrid Workshop: Exoplanet Science in the Gaia Era*.

Mapping the Eccentricity of Pale Red Dots —*Solano-Oropeza, D., Kipping, D. (2021)* Simons Foundation Center for Computational Astrophysics GothamFest 2021.

The Mixing Law and Experiments in Document Malformation —*Williams, J.R., Solano-Oropeza, D. (2021)* Fourth Northeast Regional Conference on Complex Systems.

Mock Observations of Simulated Star Formation —*Solano-Oropeza, D., Wall, J., McMillan, S. (2017)* STAR Summer Showcase 2017.

Capturing Chaos: On the Chaotic 4-Body Problem in Newtonian Gravity —*Muddu, H., Solano-Oropeza, D., Thomas, Y., Leigh, N. (2016)* 2016 NYC Science Student Research Colloquium.

Presentations

Psst, Are the Neighbors Watching? Stars That Can See Us —*Solano-Oropeza, D. (2024)* Emerging Researchers in Exoplanet Science Symposium (ERES) IX.

Speedrunning, Childhood Trauma, and Planetary Transits —*Solano-Oropeza, D. (2022)* The Science of Everyday Life, A Comedy/Storytelling Workshop at the American Museum of Natural History.

Eccentric Exo-Neighbors Orbiting Late M Stars —*Solano-Oropeza, D. (2022)* Columbia University Astrofest 2022.

Estimating Eccentricities for M-Dwarfs without Radial Velocity POP —*Solano-Oropeza, D. (2022)* 2022 Sagan Exoplanet Summer Hybrid Workshop: Exoplanet Science in the Gaia Era.

Mapping the Eccentricities of Pale Red Dots —*Solano-Oropeza, D. (2022)* 2022 Annual Bridge to the PhD. in STEM Research Symposium.

The Mixing Law —*Williams, J.R., Solano-Oropeza, D. (2021)* Fourth Northeast Regional Conference on Complex Systems.

Capturing Chaos in Gravitational Interactions —*Solano-Oropeza, D., Thomas, Y., Muddu, H., Leigh, N. (2016)* 2016 NYC Science Student Research Colloquium.

Preprints

A general solution to the preferential model —*Williams, J.R., Solano-Oropeza, D., Hunsberger, J.R. (2020)* arXiv:2008.02885

Science Articles

Noclip on! Simulated primordial black holes could dance through Sun-like stars —*Solano-Oropeza, D. (29 May 2024)* Astrobites.

Vulcan II: The Wrath of Stellar Activity —*Solano-Oropeza, D. (15 May 2024)* Astrobites.

How many astrophysicists does it take to catch a RATT? —*Solano-Oropeza, D. (22 Feb 2024)* Astrobites.

Media Communications

Quoted in **Astronomy professor David Kipping part of breakthrough exomoon discovery** —*Pagkas, S., Rossi, E. (2 Feb 2022)* The Columbia Daily Spectator.

Work Experience

Student Network Technician

Drexel University Information Technology

Philadelphia, PA
Apr 2019 – Sept 2019

- Supported network and telecommunications technicians at Drexel
- Surveyed wireless access points and analyzed them for efficiency

Desktop Assistant

Drexel University Information Technology

Philadelphia, PA
Apr 2018 – Dec 2018

- Resolved frontline technical issues in-person or through phone/email/remote access
- Communicated patiently and effectively with dozens of clients and other IT staff daily to ensure efficient problem-solving

Cinema and TV Equipment Assistant

Westphal College of Media Arts and Design

Philadelphia, PA
Sept 2016 – June 2017

- Maintained film equipment inventory for lending out to about 100 students and faculty

Archivist Intern

Bowne House Historical Society

Flushing, NY
Jun 2016 – Sept 2016

- Scanned and sorted about 30 historical documents daily for museum archives
- Awarded New York City Council Certificate of Recognition for improving historical archives

Leadership

Contract Action Team Organizer

Cornell Graduate Student Union

Ithaca, NY
Mar 2024 – Present

- Build relationships and rapport with graduate workers across Cornell, in addition to acting as a source of bargaining contract progress information and collecting testimonials and grievances.

President

Drexel Socialists

Philadelphia, PA
Apr 2019 – June 2021

- Helped organize several diversity-supporting initiatives across the school such as a campaign for sanctuary campus, an anti-racist coalition, among others

Membership

American Astronomical Society

May 2022 – Present

Society for the Advancement of Chicanos and Native Americans in Science

May 2022 – Present

Fossil Free Drexel

Jan 2018 – June 2021

Latinos for a United Campus

Sept 2017 – June 2021

Queer Students of Color

Sept 2017 – June 2021

Queer Student Union

Sept 2016 – June 2021

Women and Minorities in Physics Society

Sept 2016 – June 2021

Society of Physics Students

Sept 2016 – June 2021

Skills

Programming Languages: Python, C++, Mathematica, ADQL, SQL, IDL, Fortran

Human Languages: Spanish (Fluent), Tezoatlan Mixteco (Beginner), Classical Nahuatl (Beginner), Portuguese (Beginner), Mandarin Chinese (Beginner)

Tools: Jupyter Notebooks, Git, Supermongo, LaTeX, Microsoft Word/Powerpoint/Excel, Photoshop, Active Directory, Windows, Mac, Linux/Ubuntu, NASA Pleiades, emacs, bash, zsh

Libraries: pandas, matplotlib, numpy, spaCy, astropy, yt, FLASH, RADMC, exoplanet, orvara, lightkurve