Oscar Andrés Flores Gaitán

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Education

Licentiate in Physics — *Guatemala City*
Universidad del Valle de Guatemala — Jan 2022 – present

- **Honors**: Cum Laude
- All coursework complete. Awaiting thesis defense

International Baccalaureate (IB) Diploma / High School Diploma — *Guatemala City*
APDE El Roble — Jan 2016 – Oct 2020

- **Honors**: Summa Cum Laude

Research Interests

Exoplanet detection and characterization, planet formation and evolution, application of machine learning and statistical methods to astronomical time-series and spectral data.

Publications

2. **Flores Gaitán, O.A.**, Dodson-Robinson, S., Ramirez Delgado, V. *"How many terrestrial planets orbit Barnard's Star?"*. [Manuscript in preparation].
1. Zhao, L.L. et al., **including Flores Gaitán, O.A.**, *"The Extreme Stellar-Signals Project IV"*. [Manuscript in preparation].

Talks & Posters

6. **Flores Gaitán, O.A.**, Dodson-Robinson, S., Ramirez Delgado, V., Rubio-Herrera, E., *"How many terrestrial planets orbit Barnard's Star?"*, **Contributed Talk** at APS Mid-Atlantic Section Meeting 2025, Penn State Harrisburg, Middletown, PA, November 15, 2025. Link
5. **Flores Gaitán, O.A.**, *"Hunting for Exoplanets: Real Planets or Stellar Processes?"*, **Invited Talk** at Universidad del Valle de Guatemala's Physics Week, Guatemala City, October 25, 2025.
4. **Flores Gaitán, O.A**., Dodson-Robinson, S., Ramirez Delgado, V., *"Disentangling Planetary and Stellar Signals in Barnard's Star"*, **Poster** at Physics Science Fair at Universidad del Valle de Guatemala's Physics Week, Guatemala City, October 24, 2025.
3. **Flores Gaitán, O.A**., Dodson-Robinson, S., Ramirez Delgado, V., *"Disentangling Planetary and Stellar Signals in Barnard's Star"*, **Poster** at NASA's Towards the Habitable Worlds Observatory: Visionary Science and Transformational Technology, Johns Hopkins University, Washington, DC, July 28-31, 2025.
2. **Flores Gaitán, O.A**., Dodson-Robinson, S., Ramirez Delgado, V., *"Disentangling Planetary and Stellar Signals in Barnard's Star"*, **Poster** at Sagan Summer Workshop, NASA Exoplanet Science Institute, California Institute of Technology, Pasadena, CA, July 23, 2025. Link
1. **Flores Gaitán, O.A.**, *"Detecting and Characterizing Exoplanets Around M-Dwarfs with TESS"*, **Invited Talk** at Universidad del Valle de Guatemala's Astronomy Club, Guatemala City, May 9, 2025.

Research Experience

Undergraduate Visiting Researcher — *Newark, DE*
University of Delaware — Jun 2025 – present
Advisor: Prof. Sarah Dodson-Robinson.

Co-advisor: Victor Ramirez Delgado

- Analyzing mathematical methods for distinguishing genuine planet discoveries from stellar noise. Improving the reliability of planet detections in radial velocity (RV) data affected by stellar variability.
- Applied Gaussian Process (GP) modeling and frequency-domain techniques to disentangle stellar activity from planetary signals.

Undergraduate Researcher *Guatemala City*
Universidad del Valle de Guatemala Nov 2024 – May 2025
Advisor: Prof. Eduardo Rubio-Herrera

- Generation and analysis from exoplanetary transit data to detect and characterize exoplanets.
- Developed an algorithm for the detection and characterization of exoplanets using data from TESS.

Appointments

Teaching Assistant & Laboratory Assistant *Guatemala City*
Physics Department, Universidad del Valle de Guatemala Jan 2024 – May 2025

Designed and implemented laboratory guides for undergraduate physics courses, assisted in the setup and supervision of laboratory sessions, and graded reports. Held 7 TA appointments:

- FF2016 (Physics I) Jun 2024 – Nov 2024
- FF2017 (Physics II) Jan – May 2024 & 2025
- FF2018 (Physics III) Jun 2024 – Nov 2024
- FF3027 (Mechanics I) Jan 2025 – May 2025

Teaching Experience

Tutor *Guatemala City*
Universidad del Valle de Guatemala Jun 2022 – present

- Provided 280+ hours of one-on-one tutoring for over 30 high school and college students, prepared personalized study materials, and tracked student progress.
- Precalculus, Calculus I, Calculus II, Calculus for Business, Differential Equations, Physics I, Physics II, and Physics III

Certifications

Professional Certificate in Data Science and Machine Learning Jul 2025 – present
HarvardX (Harvard University)

- Introduction to Data Science with Python
- Machine Learning and AI with Python

Data Analysis with Python Certification
FreeCodeCamp Oct 2022 – Nov 2022

- Python for Everybody
- Data Analysis with Python

Workshops & Conferences

APS Mid-Atlantic Section Meeting 2025 *Middletown, PA*
Penn State Harrisburg Aug 2025

- **Invited Talk:** *How many terrestrial planets orbit Barnard's Star?*

Alpha-Cen Astronomy Summer School *Remote*
Alpha-Cen (Central American and Caribbean Astrophysics) Aug 2025

Towards the Habitable Worlds Observatory: Visionary Science and Transformational Technology *Washington, DC (Remote)*
NASA's Habitable Worlds Observatory Jul 2025
- **Poster:** *Disentangling Planetary and Stellar Signals in Barnard's Star*

Sagan Summer Workshop: Exoplanet Demographics *Pasadena, CA (Remote)*
NASA Exoplanet Science Institute California Institute of Technology Jul 2025
- **Poster:** *Disentangling Planetary and Stellar Signals in Barnard's Star*

Workshop on Astrophysics of High Energies and Cosmology *Guatemala City*
Universidad Nacional Autónoma de México (UNAM) Nov 2024

Awards & Achievements

- Selected for Summer Visiting Researcher Program at the Department of Physics and Astronomy, University of Delaware out of 147 applicants.
- Top 10 National Mathematics Olympiad 2020
- Achieved university's most accurate experimental measurement of gravitational acceleration (**g**)
- 3x Distinguished Student Award, Universidad del Valle de Guatemala
- 2x National Soccer Scholar Champion
- IRONMAN 70.3 Finisher and Federated Triathlete

Technical Skills

Programming Languages: Python, LaTeX, R (Intermediate), Mathematica (Basic), Java (Basic)

Data Analysis and Probabilistic Modeling: Statistical inference, Gaussian Process (GPs) modeling, Markov Chain Monte Carlo (MCMC), Bayesian modeling, time-series analysis

Astronomy Tools: Astroquery, ExoCTK, Lightkurve, AstroPy, NWelch

Other Tools: Microsoft Office, PASCO Capstone, QGIS, Adobe Photoshop, Laser Cutting, 3D Printing, Arduino

Languages: Spanish (Native), English (C1), German (C1), Portuguese (A2), French (A2)

Outreach & Leadership

- Created and published educational physics content on YouTube, including a laboratory guide video with over **1,100 views.** Link
- Authored a physics laboratory guide widely adopted by students and instructors at Universidad del Valle de Guatemala.
- Founded and managed a popular educational Instagram account focused on geography and linguistics — reached over **15,000 followers** and **5 million total views**. Link
- Member, Physics Students Association — organized science talks and led outreach initiatives for physics students.
- Vice-President, High School Student Council — proposed and implemented student-led initiatives to improve academic and extracurricular life.
- Lead Organizer, Physics Week 2025 — Led a multi-day event featuring expert talks and workshops on diverse topics in physics.
- Workshop Developer & Instructor — Designed and taught the workshop "How to Write an Academic CV", providing foundational career guidance for first-year physics students.