Dr. Fernando Gutiérrez Canales

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Summary

PhD in Astrophysics with 5+ years of experience in data modeling and visualization, statistical analysis, and software development. Built scalable Python-based data pipelines for space mission analysis (PLATO, ESA). Skilled in working with large datasets, Bayesian modeling, and machine learning. Effective communicator with a strong record of collaboration in international research environments. Now seeking to apply these skills to data-driven roles in industry, including analytics, finance, or tech.

Skills

Programming & Technical:

- **Advanced:** C, Fortran, **Python** (NumPy, SciPy, Matplotlib, Pandas, Astropy, Conda, Venv, Scikit-Learn, Jupyter notebooks).
- **Intermediate:** R, Version Control (Git and Subversion), bash, ssh
- **Beginner:** Parallel computing: OpenMP (used with Fortran and C)

Data Science & Analytics:

- **Computational modeling:** PDEs, Large Data-bases, Time-series, Data analysis, Data visualization
- Statistical analysis, Bayesian modeling, Machine learning

Domain Expertise:

- **Astrophysics:** Hydrodynamics, Planetary Transits, Radial-Velocity measurements
- Scientific computing and Algorithm development

Tools & Applications:

- Microsoft Office, Libre Office, LaTeX, Vim, nano, DS9

Languages:

- Spanish (native), English (C1), French (good) and German (basic)

Interpersonal/Soft:

- **Stakeholder Communication:** Translated complex technical findings for international research teams and presented to diverse technical audiences
- **Team Leadership & Mentoring:** Led algorithm development projects and mentored junior colleagues in Python and statistical analysis
- **Cross-functional Collaboration:** Coordinated across several institutions on mission-critical software development and data analysis with strict deadlines
- **Data Problem-solving:** Developed innovative approaches to handle noisy, large-scale datasets and signal detection
- **Technical Project Management:** Utilized and produced containerized (Docker) analysis pipelines using agile development practices

Research Experience & Education

PhD — Paris Observatory and Max Planck Institute for Solar System Research — March 2022 – March 2025

- **Thesis:** The PLATO space mission: Double-aperture photometry and Centroid Shifts to detect False Positives
  - Grade: **With honors**
- **Key result:** Developed python-based simulations to estimate the detection efficiency of exoplanet vetting techniques (the established centroid shift and the novel double-aperture photometry) for the PLATO space mission. Integrated C and bash libraries; published code on Gitlab. The produced results constitute the first estimation of the overall efficiency of both techniques.
- Collaborated with an international consortium (<20 institutions and countries) on instrument development and pipeline design for ESA's PLATO space mission.

Research intern — ESTEC (European Space Agency), The Netherlands — 2023

- Estimated Charge Transfer Inefficiency, CTI, parameters for real PLATO detectors using Python and DS9.
- Conducted in-situ measurements with a real PLATO CCD detector

Master's degree in Sciences: Astrophysics — University of Guanajuato, Mexico — 2019 - 2021

- **GPA: 9.5/10**
- **Thesis:** Homogeneous Analysis of K2 exoplanet systems hosting USP planets
- **Key result:** Implemented and mastered the scientific software pyaneti to improve exoplanet parameter estimation for systems discovered by the K2 space mission.

Bachelor's Degree in Physics — University of Guanajuato, Mexico — 2014 – 2019

- **GPA: 9.0/10**
- **Undergraduate Research Assistant** in the group of Non-linear Optics of the University of Guanajuato
- **Thesis:** Atomic theory and scientific realism
- **Key result:** Developed a scientific publication about the most important philosophical and physical ways to show that atoms exist.

Conferences

- EAS (European Astronomical Union) — 2024
- PLATO Week # 15 Meeting — 2024
- PLATO Week # 14 Meeting — 2023
- Workshop *Journé des thèses* — 2022

Scholarships & Awards

- PhD obtained with Honors — 2025
- Erasmus+ scholarship for an internship at ESTEC, the largest European Space Agency (ESA) center in Europe — 2023
- Master's degree obtained with Honors — 2021
- Scholarship for studying a master's degree in Mexico with international competence — 2018
- Bachelor's degree obtained with Honors — 2019

Publications

- Interpretation of Optical and IR Light Curves for Transitional Disk Candidates in NGC 2264 Using the Extincted Stellar Radiation and the Emission of Optically Thin Dust Inside the Hole, 2021, E. Nagel, F. Gutiérrez-Canales, S. Morales-Gutiérrez and A. P. Sousa.
- The young HD 73583 (TOI-560) planetary system: Two 10-$M_\oplus$ mini-Neptunes transiting a 500-Myr-old, bright, and active K dwarf, 2023, O. Barragán,.., F. Gutiérrez-Canales, ..., E. Nagel
- Detecting False Positives with PLATO using Double-Aperture Photometry and Centroid Shifts , F. Gutiérrez-Canales, R. Samadi A. Birch, submitted in December 2024.