

Alexander Sarango

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EDUCATION

BSc in Physics, Escuela Superior Politécnica de Chimborazo
Bachelor thesis: Gravastar model with vanishing complexity.

Oct 2020 - Feb 2025

EMPLOYMENT

Research Associate Sep 2025 - Present
Grupo de Energías Alternativas y Ambiente, ESPOCH
Research Project IDIPI-306 “Predicting climate behavior patterns using machine learning techniques in the province of Chimborazo”.

RESEARCH EXPERIENCE

Faculty of Science, ESPOCH, Ecuador Apr 2024 - Feb 2025

Bachelor Thesis

Supervisor: MSc. Julio Andrade

- Developed a new gravastar interior solution under the vanishing complexity condition providing a viable alternative in the study of these kind of compact objects.
- Utilized the extended minimal geometric deformation approach within the gravitational decoupling framework of General Relativity.
- Verified the new gravastar interior solution satisfies all necessary physical conditions to be considered a physically acceptable model.

Grupo de Energías Alternativas y Ambiente, ESPOCH, Ecuador

Oct 2024 - Jan 2025

Research Assistant

Supervisor: Biophys. Isabel Balvoa

- Implemented a dynamic clustering algorithm in Python based on K-Means algorithm to analyze and predict climate behavior patterns, leveraging large datasets to identify trends and improve forecast accuracy.
- Developed an extensive framework of data analysis and unsupervised machine learning algorithms focused on clustering techniques for forecast prediction.
- Adapted to and worked across different environments (Spyder, Jupyter, VS Code) to support varied project requirements and enhance results.

CONFERENCES & ADDITIONAL TRAINING

XI Escuela Ecuatoriana De Astronomía y Astrofísica

Jul-Aug 2025 (*Online*)

Escuela Politécnica Nacional, Ecuador

II São Paulo School on Gravitational Physics

Jul 2025 (*Online*)

Brazil

II Simposio de Física Teórica y Computacional

Jan 2025 (*In-person*)

Yachay Tech University, Ecuador

V Congreso Internacional De Física 2024

Oct 2024 (*In-person*)

Escuela Superior Politécnica de Chimborazo, Ecuador

IV Congreso Internacional De Física 2023

Oct 2023 (*In-person*)

Escuela Superior Politécnica de Chimborazo, Ecuador

OUTREACH AND EXTRACURRICULAR ACTIVITIES

Student Representative

2023 - 2025

Represented students as a member of Physics Students Association facilitating communication between them and Faculty at Escuela Superior Politécnica de Chimborazo.

GitHub for Team Collaboration

2025

Organized this short mini-workshop along with Club de Física Emmy Noether at Escuela Superior Politécnica de Chimborazo for introducing students the basic tools of Git for team collaboration projects within GitHub.

Head of Programming Committee at CFEN

2023 - 2025

Headed a student group with the aim of performing activities about programming, including workshops and collaborative projects, to enhance technical skills and foster teamwork.

Project Coordinator

2023

Co-organized the “Online mini course: Introduction to General Relativity”, a collaborative project organized by PWF-ICTP, CFEN and ESPOCH.

Introduction to LaTeX

2023

Organized this introductory course along with Club de Física Emmy Noether for providing students the basic notions of programming in LaTeX at Escuela Superior Politécnica de Chimborazo.

Head of External Relationships Committee at CFEN

2022 - 2024

Headed a student group with the aim of creating links with national and international organizations, facilitating collaborative projects and networking opportunities.

TALKS

Gravastars, the missing piece of the cosmic puzzle?

Nov 2024

Delivered a presentation at the Café Científico organized by CFEN to an audience of over 20 students, explaining the theory about gravastars and demonstrating their theoretical advantages.

VOLUNTEER EXPERIENCE

Workshops on Meteorology and Climatology, ESPOCH

2024-2025

Developed and delivered workshops on climatology and meteorology for high school students of rural villages to enhance their understanding of environmental science, including visits at ESPOCH's weather stations to collect and analyze data from weather instruments.

Hands-On Astronomy, OEAA

2023 (*Online*)

Contributed to the Ecuadorian Olympiad on Astronomy and Astrophysics as professor of Quantum Physics to train young students around the country before the evaluation process.

COMPUTATIONAL SKILLS

Programming languages: Python, Mathematica, Git.

Libraries: numpy, matplotlib, xarray, pandas, etc.

Tools: GitHub, L^AT_EX.

LANGUAGES

Spanish (native), English (fluent), Chinese (beginner).

REFERENCES

References available upon request .

Last updated on October 20, 2025.