Edwin Laverde

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Colombian

Education

B.Sc. in Physics — *Mar 2020 – Aug 2025 (Expected)*
Universidad Nacional de Colombia — *Bogotá D.C., Colombia*

- *GPA: 46/50*
- *Thesis:* "Study of Mass Segregation in Simulations of Star Clusters with Primordial Binaries"
- *Advisors:* Verónica Arias, Allison Sills

Technician Degree on Computer Programming — *Feb 2017 – Nov 2018*
Servicio Nacional de Aprendizaje (SENA) — *Bogotá D.C., Colombia*

Certificates

Online course on Simulation and Modeling of Natural Processes — *Jan 2024*
University of Geneva, Coursera

Diploma of studies in Artificial Intelligence and Deep Learning — *Aug – Oct 2022*
Universidad Nacional de Colombia

Diploma of studies in Galaxies in our Universe — *Oct – Dec 2018*
Universidad de los Andes

Research Internships

Globalink Research Internship - MITACS — *Summer 2024*
McMaster University — *Hamilton, ON, Canada*
Topic: The Evolution of Kinematic and Spatial Substructure during Star Cluster Assembly
Supervisors: Alison Sills & Claude Cournoyer-Cloutier

Scholarships and Awards

Globalink Graduate Fellowship — *2025*
MITACS

Presentations

Talks

Spatial and Kinematic Substructure During Star Cluster Assembly — *Aug 2024*
Summer Student Symposyum, McMaster University — *Hamilton, Canada*

Posters

Spatial and Kinematic Substructure During Star Cluster Assembly — *Aug 2024*
Star formation across the scales, *McMaster University* — *Hamilton, Canada*

Projects

Study of Mass Segregation in Simulations of Star Clusters with Primordial Binaries — *Sep 2024 – Present*
McMaster University; Universidad Nacional de Colombia — *Supervisors: Alison Sills, Verónica Arias*

- *The effect of primordial binaries in the evolution of star clusters represents a crucial part in the study of these clusters. In this project we aim to detect the effects that binary systems have in the mass segregation of a cluster. So far we have found an increase in the **mass segregation ratio** due to the presence of binary systems. Current efforts are aimed at measuring mass segregation using different statistics (such as A+). This project is being done as part of my bachelor's thesis.*

Study of Spatial and Kinematic Substructure During Star Cluster Assembly — *Summer 2024*
McMaster University — *Supervisors: Alison Sills, Claude Cournoyer-Cloutier*

- *Studied the evolution of the spatial-kinematic substructure present during the formation of **young star clusters** using complex **simulations**. During the internship I became familiar with the many theoretical aspects of the problem and of the systems at hand. I analysed and proposed different ways to tackle the problem and deal with the data. We found that kinematic substructure persists for longer than the spatial.*

Finite Element approach for solving the MHD equations — *Mar - Sep 2024*
Lawrence Livermore National Laboratory; UNAL — *Supervisors: Boyan Lazarov, Carlos Galvis*

- *Used the finite element library **MFEM** for solving the **magnetohydrodynamics** equations, in particular for the simple Hartmann flow, by considering initially the solution of both the velocity and magnetic fields separately, and then by solving the coupled block system. Also did a convergence analysis to see the behaviour of the errors. This project was done as part of the **Beyond Research** program in which I was selected to participate.*

Complete Automation of a Heat Capacity Experiment with Liquid Nitrogen *Apr - Jun 2023*
Universidad Nacional de Colombia *Supervisor: Javier Cardona*

- *Developed an **Arduino** program to control a total of 3 sensors and instruments so that the data measurement for the experiment was completely automatic. This was coupled with a python script that processed the data in real time to display a graph and to carry out the data analysis, with regressions and calculations, to give the value of the heat capacity of a sample material.*

Variety of projects during my undergrad

- *Have worked on and contributed to many projects during my formation as a physicist. Further information for a selection of these can be found on my **personal page**.*

Professional Experience

Teaching

Black Holes and Time Machines *2024*
Teaching Assistant *Observatorio Astronómico Nacional, UNAL*

Astronomy for Everyone *2023*
Teaching Assistant *Observatorio Astronómico Nacional, UNAL*

Conferences

Member of Local Organizing Comittee *2023*
Latin American Conference on Astrophysics and Relativity

Research Groups

Research Group of Computational Astrophysics *Feb 2022 – Present*
Observatorio Astronómico Nacional – UNAL

Research Group of Simulation of Physical Systems *Jul 2023 – Present*
Departamento de Física – UNAL

Research Group of Numerical Relativity *2023 – 2024*
Observatorio Astronómico Nacional – UNAL

Technical skills

Programming Languages	Python | C++ | Bash | R | Arduino | JavaScript
Data Visualization	Matplotlib | Imageio | P5
Data Analysis	Numpy | Pandas | Scipy | Astropy | YT
High Performance Computing	OpenMP | MPI
Machine Learning	TensorFlow | PyTorch

Languages

Spanish | Native - **English** | Fluent - C1 - **French** | Beginner - A2

Academic References

Alison Sills
Professor & Chair
Department of Physics and Astronomy, McMaster University
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Verónica Arias Callejas
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