

# Miguel A. Sabogal García

## Curriculum Vitæ

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Over the last 3 years I actively participated in many physics research that resulted in international scientific publications. These experiences allowed me to acquire strengths in leadership, creativity, and perseverance while building skills in a wide range of programming languages, developing specialized software, and performing data management.

### Research Experience, Publications, and Projects

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#### Peer-Reviewed Publications

- Cardona, W., & **Sabogal, M. A.** Holographic energy density, dark energy sound speed, and tensions in cosmological parameters:  $H_0$  and  $S_8$ . Journal of Cosmology and Astroparticle Physics, 2023(02), 045. [DOI: 10.1088/1475-7516/2023/02/045](https://doi.org/10.1088/1475-7516/2023/02/045) [arXiv:2210.13335](https://arxiv.org/abs/2210.13335).
- Oliveros, A., **Sabogal, M.A.**, & Acero, M.A. Barrow holographic dark energy with Granda–Oliveros cutoff. Eur. Phys. J. Plus 137, 783 (2022). [DOI: 10.1140/epjp/s13360-022-02994-z](https://doi.org/10.1140/epjp/s13360-022-02994-z).
- **Sabogal, M. A.** , Parra, I. C. , Bandera, M. , Gallardo, J. , & Mejía-Cortés, C. (2020, May). Mobility of localized beams in non-homogeneous photonic lattices. In Journal of Physics: Conference Series (Vol. 1547, No. 1, p. 012023). IOP Publishing. [DOI: 10.1088/1742-6596/1547/1/012023](https://doi.org/10.1088/1742-6596/1547/1/012023).

#### In Preparation

- **Sabogal, M.A.**, & Gonzalez, J.(2022). Hubble constant estimation from BAO signals with LSST-simulated data. [Draft: zenodo.7131390](https://zenodo.org/record/7131390).

### Professional experience

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02/2023 - Current **High school teacher**, Fundación Educativa Instituto Experimental del Atlántico "José Celestino Mutis".

Tasks performed:

- Teaching Physics and programming courses
- Preparation of syllabus and pedagogical materials
- Examination preparation and student grading

05/2022 - 08/2022 **Research intern**, Red de Estudiantes de Astronomía de Colombia, and LSST observatory.

Tasks performed:

- Design and development of specialized software in Python and Writing of scientific articles
- Statistical analysis using Markov chain Monte Carlo (MCMC)
- Non-parametric reconstruction using Gaussian Processes (Machine Learning)
- Develop the end-to-end project plans with the execution team

06/2020 - 12/2022 **Junior Software Developer**, Instituto Colombiano de Neurociencias Aplicadas SAS.

Tasks performed:

- Assisting Senior Developer with the development, and maintenance of all menu maintenance portal code using Python
- Developing automation scripts in Python for data management
- Keeping the project manager informed of the overall status of the solution
- Be part of technical discussions and solution

### Volunteer experience

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08/2019 - 06/2022 **Supportive Mentor**, Physics Program, Universidad del Atlántico

Tasks performed:

- In-person and virtual classes of Physics and Mathematics
- Academic support to students in their first semesters and mid-career.
- Mentoring colleagues providing advice and guidance on best practice and development techniques

### Education

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- 2015 – 2022 **Physicist**, Bachelor's degree/ Universidad del Atlántico.

## Computational skills

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Specialized software **Cosmic Linear Anisotropy Solving System (CLASS)** and **Gaussian processes (GaPP)**: Advanced  
**Python**: Advanced, **C/C++**: Intermediate, **Fortran 90**: Intermediate, **MATLAB/Mathematica/Excel**: Advanced, **HTML**: Basic  
**Techniques**: Process Automation, Machine Learning, Statistical analysis using MCMC, Web scraping, Object-oriented programming.  
**Tools**: Selenium, BeautifulSoup, Scrapy, NumPy, SciPy, Pandas.

## Honors and Awards

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- Funding award "**Enabling Science Program 2021 Award - 51**", granted by the Legacy Survey of Space and Time (LSST) observatory.
- **Undergraduate Honors Thesis**, Universidad del Atlántico.

## Additional languages

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<b>English (TOEFL certified)</b>	Read: <b>C1</b>	Speak: <b>B2</b>	Write: <b>B2</b>	Listen: <b>C1</b>	<b>Test date:</b> Nov 2022
<b>Portuguese</b>	Read: <b>A2</b>	Speak: <b>A2</b>	Write: <b>A1</b>	Listen: <b>A2</b>	

## Presentations and Events

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**Event:** XIV Latin American Symposium on High Energy Physics  
**Type of event:** International Congress  
**Type of participation:** Speaker  
**Conference title:** [Decoding Holographic Dark Energy in the structure formation.](#)  
**Place:** QUITO, ECUADOR - Universidad San Francisco de Quito, 14/11/2022 – 18/11/2022.

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**Event:** CoCo 2021: Cosmology in Colombia  
**Type of event:** National Congress  
**Type of participation:** Speaker  
**Conference title:** [Cosmological analysis of Barrow holographic dark energy model considering the Granda-Oliveros infrared cutoff.](#)  
**Place:** Online, 08/09/2021 – 11/09/2021.

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**Event:** RECA Internships 2022 Symposium  
**Type of event:** National Symposium  
**Type of participation:** Speaker and Research intern  
**Conference title:** [Hubble constant estimation from BAO signals with LSST-simulated data.](#)  
**Place:** Online - Universidad de Antioquia, 29/08/2022 – 30/08/2022.

## Courses and certifications

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**PYTHON IN ASTRONOMY** Astropy Course(2022)

## Work references

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**Mario A. Acero Ortega, Ph.D. in Physics** [ORCID](#).  
Associate Professor, Physics Program, Faculty of Basic Sciences, Universidad del Atlántico.  
Regular Member and Co-Founder of Colombian Network on High Energy Physics  
Distinction from Neutrino Physics Center, Fermilab: Batavia, Illinois, US  
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