

Sofía Álvarez-López

sofiaal@mit.edu

184 Albany St. NW22-269, Cambridge, MA, 02139

Webpage: <https://www.space.mit.edu/people/sofia-alvarez-lopez/>

Inspire HEP: <https://inspirehep.net/authors/2800343>

Research Interests	As a member of the MIT Kavli Institute for Astrophysics and Space Research and the LIGO Scientific Collaboration, my main research interest is gravitational-wave (GW) (astro)physics. I'm interested in using Bayesian statistics and data science techniques to understand the populations of black holes and neutron stars in our Universe from their gravitational-wave imprint. Additionally, I have also worked on detector characterization and data calibration efforts to assist in GW searches and discoveries.	
Education	<i>Ph.D. in Physics</i> Massachusetts Institute of Technology, Cambridge, MA Advisor: Professor Salvatore Vitale	Aug. 2023 - Today
	<i>Bachelor of Science in Physics</i> <i>Summa Cum Laude in Physics</i> Universidad de los Andes, Bogotá, Colombia GPA: 4.78/5.0	Aug. 2017 - Jun. 2023
	<i>Bachelor of Science in Systems and Computing Engineering</i> <i>Summa Cum Laude in Systems and Computing Engineering</i> Universidad de los Andes, Bogotá, Colombia GPA: 4.78/5.0	Aug. 2018 - Jun. 2023
	<i>Minor in Astronomy</i> Universidad de los Andes, Bogotá, Colombia	Aug. 2022 - Jun. 2023
Experience	<i>MITACS Globaling Research Intern</i> The University of British Columbia, Vancouver, BC <i>Gravitational wave astrophysics group at UBC</i> Advisor: Professor Jess McIver	May 2022 - Aug. 2022
Awards and Honors	Graduate ACM SIGHPC/Intel Computational and Data Science Fellowship	2025-
	NSF LIGO Laboratory Honorable Mention for Excellence in Detector Characterization and Calibration	2024, 2025
	Mario Santo Domingo Fellowship <i>Massachusetts Institute of Technology</i>	2024-2025
	MIT Department of Physics Graduate Fellowship <i>Massachusetts Institute of Technology</i>	2023-2024, 2026-2028

<i>Undergraduate</i>		
Summa Cum Laude in Physics <i>Universidad de los Andes</i>		2023
Summa Cum Laude in Systems and Computing Engineering <i>Universidad de los Andes</i>		2023
Ramón de Zubiría Award for Academic Excellence <i>Universidad de los Andes</i>		2023
Top Performer on the National Higher-Education Exam “Saber Pro” <i>Colombian Ministry of Education</i>		2023
Mitacs Globalink Summer Research Internship Awardee (\$12.000 CAD) <i>University of British Columbia</i>		2022
Publications	As a member of the LIGO Scientific Collaboration since 2022, I am a co-author on several collaboration papers. Here, I list my first author publications or other publications to which I have contributed significantly.	
	Álvarez-López, S. , Heinzel, J., Mould, M., Vitale, S. “Nowhere left to hide: revealing realistic gravitational-wave populations in high dimensions and high resolution with PixelPop” (2025). ArXiv: https://arxiv.org/abs/2506.20731 .	
	Heinzel, J., Mould, M., Álvarez-López, S. , Vitale, S. “High Resolution Nonparametric Inference of Gravitational-Wave Populations in Multiple Dimensions.” <i>Physical Review D</i> (2025). DOI: https://doi.org/10.1103/PhysRevD.111.063043 .	
	Soni, S. et al (incl. Álvarez-López, S.) “LIGO Detector Characterization in the first half of the fourth Observing run.” <i>Classical and Quantum Gravity</i> (2025). DOI: https://doi.org/10.1088/1361-6382/adc4b6 .	
	Álvarez-López, S. , Liyanage, A., Ding, J., Ng, R., McIver, J. “GSpyNetTree: A signal-vs-glitch classifier for gravitational-wave event candidates.” <i>Classical and Quantum Gravity</i> (2024). DOI: https://doi.org/10.1088/1361-6382/ad2194 .	
	Raimbaud, P., Álvarez-López, M.S. , Figueroa, P., Hernandez, J.T., “Influence of Depth Cues on Eye Tracking Depth Measurement in Augmented Reality Using the MagicLeap Device.” <i>2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)</i> (2020), pp. 210-214. DOI: 10.1109/VRW50115.2020.00045	
Manuscripts in preparation	Álvarez-López, S. , Herbst, F., Chan, M., Dhatri, R., Liyanage, A., Ding, J., García-Varela, A., Ng, R., McIver, J. “GSpyNetTree-II: a gravitational-wave signal vs glitch classifier for the fourth LIGO-Virgo-KAGRA observing run” <i>In prep.</i>	

Invited presentations

1. **Scientific Machine Learning for Gravitational Wave Astronomy**
NSF Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, Providence, RI. June 2025
Building GSpyNetTree-II: a gravitational-wave signal vs glitch classifier for the fourth LIGO-Virgo-KAGRA observing run ([Meeting website](#), [recording](#)).
2. **Universidad de los Andes Astrophysics seminar**
Bogotá, D.C. April 2022
Discovering gravitational-wave signals: Analysis and visualization of LIGO data.

Contributed presentations

1. **Gravitational Wave Physics and Astronomy Workshop 2025**
Atlanta, GA December 2025
Revealing realistic gravitational-wave populations in high dimensions and high resolution with PixelPop.
2. **24th International Conference on General Relativity and Gravitation and 16th Edoardo Amaldi Conference on Gravitational Waves**
Glasgow, UK July 2025
Revealing realistic gravitational-wave populations in high dimensions and high resolution with PixelPop.
3. **American Physical Society Global Physics Summit**
Anaheim, CA March 2025
Measuring Multidimensional Correlations in Realistic Astrophysical Populations of Gravitational-Wave Sources Using Nonparametric Inference.
4. **15th Edoardo Amaldi Conference on Gravitational Waves**
Virtual July 2023
GSpyNetTree: A signal-vs-glitch classifier for gravitational-wave event candidates ([Amaldi15 agenda](#), [session recording](#)).
5. **Gravitational Wave Astronomy Northwest Meeting (GWANW)**
Hanford, WA June 2023
GSpyNetTree: A signal-vs-glitch classifier for GW candidates ([GWANW 2023 agenda](#)).

Posters

1. **Scientific Machine Learning for Gravitational Wave Astronomy**
NSF Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, Providence, RI. June 2025
Measuring correlations in astrophysical gravitational-wave populations using PixelPop.
2. **APS Conference for Undergraduate Women in Physics (CUWiP)**
Virtual February 2023
GspyNetTree: distinguishing gravitational-wave signals from detector transient noise for the fourth LIGO-Virgo-KAGRA observing run ([APS CUWiP Epitome](#)).
3. **LIGO-Virgo-KAGRA collaboration meeting poster session**
Cardiff University, Cardiff, Wales September 2022
GSpyNetTree: Improving Gravity Spy classifications toward O4.

Academic Service

Referee *Classical and Quantum Gravity*
Institute of Physics trusted reviewer

Teaching	Teaching Assistant	<ul style="list-style-type: none"> • Electromagnetism I (2021) • Quantum Mechanics I (2021) • Differential Calculus (2018) • Object Oriented Programming and Algorithmic I (2018) • Computational Infrastructure (2020)
Grader	Grader	<ul style="list-style-type: none"> • 8.041 Quantum Physics I (2024) • Transactional Systems (2020)
Grants	Division of Gravitational Physics (DGRAV) Student Travel Grant for APS April Meeting (\$600 US)	2025
MIT School of Science Quality of Life grant (\$1800 US)	Fall 2024	<ul style="list-style-type: none"> • Awarded \$1800 US to host a Latino faculty-graduate student lunch series with the Latinx Graduate Student Association (LGSA) at MIT. Our events encourage open conversations about challenges and successes in academia, while also providing opportunities for mentorship and professional networking in a casual and supportive environment.
MIT Graduate Student Experience Grant (\$1600 US)	Fall 2024	<ul style="list-style-type: none"> • Awarded \$1600 US to celebrate Hispanic Heritage Month with the Latinx Graduate Student Association (LGSA) at MIT.
Career Mentorship	Mentor , PhysGAAP mentor at MIT Physics	2023, 2024
	<ul style="list-style-type: none"> • PhysGAAP (Physics Graduate Application Advising Program) is an MIT Physics initiative that pairs current graduate students with prospective applicants to the Physics PhD program. It emphasizes on supporting students coming from minorities or underrepresented groups, and that would otherwise feel a barrier to apply to MIT. 	
	Mentor , MIT Women in Physics Mentorship Program	2024
	Mentor , Universidad de Los Andes Physics first-year mentorship program	2021
Leadership, Outreach, and Engagement	MIT Summer Research Program application reviewer	January 2025 - present
	<ul style="list-style-type: none"> • Member of the admissions committee for an undergraduate MIT Summer program designed to support undergraduate students with limited access to research opportunities. Help expand access to career development and networking resources. 	
	MIT Physics Graduate Ambassador	October 2024 - present
	<ul style="list-style-type: none"> • The Graduate Ambassadors are current MIT graduate students who partner with the Office of Graduate Education to create a more diverse, equitable, and inclusive community at MIT. • Here is my Ambassador profile. 	
	Latinx Graduate Student Association	Fall 2024
	<ul style="list-style-type: none"> • I served as the treasurer for the Latinx Graduate Student Association (LGSA), which aims to build a graduate student Latino community and highlight Latino 	

researchers at MIT.

- I've written and been awarded several grants to highlight our culture, celebrate our traditions, and empower MIT Latino graduate students.

Astrogazers

November 2023 - present

- I am part of Astrogazers, a group of MIT graduate students dedicated to sharing our passion for astrophysics with the general public in the Boston area. I've participated in several events, including a stargazing night and an ask-me-anything session.

Graduate Women in Physics (GWiP)

November 2023 - present

- At GWiP, I am part of the travel committee, which approves travel grants for women MIT graduate students in Physics to attend conferences or schools. Additionally, I'm part of the GWiP-UWiP (Undergraduate Women in Physics) mentorship program, providing advice to MIT women undergraduates in Physics.

Gravity Spy blog contributor

September 2020

- Contributed to the [Gravity Spy blog](#), an initiative of LIGO's Gravity Spy project members to showcase work on detector characterization and interface with both the public and the scientific community.

Girl Up Campus Club Founding Member and President

Universidad de los Andes

Jan. 2018 - Dec. 2020

- Willing to advocate for women (especially in STEM), I founded the first Girl Up Campus Club in Colombia. Girl Up is a United Nations Foundation initiative which aims to help adolescent girls in developing countries. We develop activities in favor of Girl Up's objectives (health, education, gender equality and abolition of gender violence) whilst empowering women in our own community, so that every girl and every woman is able to achieve her dreams and her full potential.
- Made part of Girl Up + Disney's global campaign: Dream Big, Princess.
- Organized and held various conferences with recognized University forums (+200 people reached) to empower young women to consider careers in STEM and discuss gender bias in STEM fields with female colombian Physics Faculty.

Volunteer and Panelist, Professional Orientation Forum May 2018 - Nov 2018

- Volunteer and panelist in the Women for Colombia ("Mujeres por Colombia") forum for low-income high school female students to motivate them to get into STEM, to increase women's participation in these fields. I have been a panelist in Physics and Systems and Computing Engineering.

Volunteer, Colombian Network of Female Scientists (RCMC)

Sep. 2019

- I represented RCMC as a volunteer at the outreach event "Cacharrrear con Ciencia-ExpoCiencia" in which we introduced to 700+ primary and middle school students the work of the female Physics Nobel Laureates and showcased demonstration experiments.

Extracurricular Activities

Tennis and Piano

- I love playing tennis and playing the piano in my free time