

Karolina Garcia

Astronomy PhD Candidate

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Cosmologist developing mathematical tools, simulations, and using machine learning techniques to study the evolution history of the Universe. Throughout the last few years, developed a more robust way of computing the 3PCF of galaxies; promoted tests to one of the Euclid's algorithms for finding galaxy clusters; optimized survey strategies for measuring peculiar velocity fields with Type Ia supernovae; and helped build the pipeline for supernova detection with J-PAS and J-PLUS. Currently working on modeling molecular line emission in cosmological simulations to produce realistic predictions from galaxy and line intensity mapping observations.

Education

- 2018-07 – 2024-07 **Ph.D.: Astronomy**
University of Florida -- Gainesville, FL, USA
- Emphasis on Cosmology and Astrophysics
 - GPA: 3.86/4.00
- 2018-07 – 2019-12 **Master of Science: Astronomy**
I. University of Florida -- Gainesville, FL, USA
(granted 2022-05)
- GPA: 3.86/4.00
- 2016-03 – 2018-04 *II. Federal University of Rio de Janeiro – Rio de Janeiro, RJ, Brazil*
- GPA: 2.54/3.00
- 2010-03 – 2014-12 **Bachelor of Science: Industrial Engineering**
Pontifical Catholic University of Rio de Janeiro – Rio de Janeiro, RJ, Brazil
- Bachelor in Industrial Engineering — Minor in Entrepreneurship
 - Supplementary courses in logistics and supply chain management, procurement strategies, applied computational intelligence, and social entrepreneurship.
 - GPA: 8.2/10

Publications

- Submitted **Karolina Garcia**, Desika Narayanan, Gergö Popping, R. Anirudh, Sagan Sutherland, Melanie Kaasinen; [SLICK: Modeling a Universe of Molecular Line Luminosities in Hydrodynamical Simulations](#); submitted to ApJ; arXiv:2311.01508
- 2022 **Karolina Garcia**, Zachary Slepian; [Improving the Line of Sight for the Anisotropic 3-Point Correlation Function of Galaxies: Centroid and Unit-Vector-Average Methods Scaling as \$O\(N^2\)\$](#) ; MNRAS 515 (2022) 1, 1199–1217.
- 2020 **Karolina Garcia**, Miguel Quartin, Beatriz B Siffert; [On the amount of peculiar velocity field information in supernovae from LSST and beyond](#); Phys. of the Dark Univ. 29 (2020) 100519, 2212–6864.
- 2020 Wladimir Lyra, Melissa Rice, Dhyan Adler-Belendez, Neil Jacobson, Ana Pantelic, **Karolina Garcia**, L Sattler Cassara, Carolyn Crow, Paul Hayne, Jeffrey Marlow. [Ad Astra Academy: Using Space Exploration to Promote Student Learning and Motivation in the City of God, Rio de Janeiro, Brazil](#); Communicating Astro. w/ the Public Journal 27 (2020).
- 2019 Andres J Cenarro, M Moles, David Cristóbal-Hornillos [...] **Karolina Garcia** [...]. [J-PLUS: The Javalambre Photometric Local Universe Survey](#). A&A 622 (2019) A176.

Research and Teaching Experience

- 2018-07-
present
- Graduate Researcher**
University of Florida -- Gainesville, FL, USA
- Expert in modeling the light coming from interstellar regions in cosmological scales using PDR models and ML techniques. This allows for galaxy evolution studies, and Line Intensity Mapping observation forecasts;
 - Developed new methods for improving the 3-point correlation function analysis in galaxy surveys such as DESI;
 - Worked on one of Euclid's galaxy cluster detection pipeline, and applied it to Spitzer data to find high-redshift clusters.
- 2021-01 –
2021-12
- Teaching Assistant**
University of Florida -- Gainesville, FL, USA
- **Spring 2021, Class: Discover the Universe** – Assisted undergraduate students with different backgrounds in various activities, projects and discussion forums for introductory Astronomy.
 - **Fall 2021, Class: Observational Techniques** – Assisted Astronomy undergraduate students on their first contact with telescopes and observing nights, as well as how to post process and analyze data using python.
- 2018-07-
2018-08
- Board of Education (BOE) Fellow**
University of Florida -- Gainesville, FL, USA
- Participated in professional development workshops, graduate seminar, and academic writing classes;
 - Performed completeness and purity tests on one of the Euclid's algorithms for finding galaxy clusters.
- 2016-03 –
2018-04
- Graduate Researcher**
Federal University of Rio de Janeiro – Rio de Janeiro, RJ, Brazil
- Conducted a theoretical study on how to optimize survey strategies in order to measure peculiar velocity fields with Type Ia supernovae;
 - Helped develop the Type Ia supernova detection pipeline for J-PAS/J-PLUS surveys.
- 2015-09 –
2016-02
- Physics Teacher**
INVEST Course – Rio de Janeiro. RJ, Brazil
- Helped low-income students get into accredited universities by teaching them physics once a week as a volunteer.
- 2012-08 –
2012-11
- Mathematics Tutor and Advisor**
Colégio PH (Elementary, Middle and High school) – Rio de Janeiro, RJ, Brazil
- Tutored students ages 11 to 22 in Mathematics;
 - Supported the educational development of 200+ students ranging from Elementary to High School and beyond
- 2011-09 –
2012-09
- Undergraduate Researcher**
Pontifical Catholic University of Rio de Janeiro – Rio de Janeiro, RJ, Brazil
- Undergraduate research on the development of nanocomposites with negative thermal expansion

Professional Service

- 2021 –
present
- Newsletter and Press Release Committee**
Department of Astronomy, University of Florida

Community Involvement and Interests

2015 – present **Ad Astra Academy** – Educational outreach and documentary project whose objective is to inspire disadvantaged students to discover opportunities through science and exploration. Website: adastra.world

2017 – present **AstroTubers** – Brazilian outreach Youtube channel that aims to make science accessible and enjoyable by everyone. I am one of the founders and project's coordinators. Website: youtube.com/astrotubers

Industry Employment History

2015-08–
2016-02 **Finance Analyst**
Royal Dutch Shell – Rio de Janeiro, RJ, Brazil

- Brazil's local responsible for Shell Lubricants' Global Key Accounts;
- Developed automated tools to calculate finance numbers, produce reports, and monitor business performance;
- Led improvements on Lubricants management information tools for more fit for purpose processes.

2015-04–
2015-08 **Pricing Strategy Consultant**
Hyper Consulting Company – Rio de Janeiro, RJ, Brazil

- Participated in operational and strategic pricing analysis projects for Coca-Cola.

2013-08–
2015-02 **Finance Intern**
Royal Dutch Shell – Rio de Janeiro, RJ, Brazil

- Interfaced with business and Brazil's Lubricants team to produce reports and monitor performance;
- Created automated tools to calculate commissions (+USD 0.5MM) paid to Shell Lubricants' Global Key Accounts, and monitor their performance in Brazil;
- Developed and implemented a graphical reporting tool that provides customized data related to volume of sales, costs, revenue and profit margins.

2013-07–
2013-08 **Facilities & Supply Management Intern**
Vale S.A. -- Rio de Janeiro, RJ, Brazil

- Served as maintenance liaison & food catering supply coordinator at a multinational: one of the largest logistics operators in Brazil;
- Provided support and input to the development of work plans needed for negotiation and bid analysis.