

# Karolina Garcia

Astronomy PhD Candidate

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Cosmologist developing mathematical tools and simulations 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

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| 2018-07 –<br>Current | <b>Ph.D.: Astronomy</b><br><i>University of Florida -- Gainesville, FL, USA</i> <ul style="list-style-type: none"><li>• Emphasis on Cosmology</li><li>• GPA: 3.86/4.00</li></ul>   |
| 2016-03 –<br>2018-04 | <b>Master of Science: Astronomy</b><br><i>Federal University of Rio de Janeiro – Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"><li>• Emphasis on Cosmology</li><li>• GPA: 2.54/3.00</li></ul>   |
| 2010-03 –<br>2014-12 | <b>Bachelor of Science: Industrial Engineering</b><br><i>Pontifical Catholic University of Rio de Janeiro – Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"><li>• Bachelor in Industrial Engineering — Minor in Entrepreneurship</li><li>• Supplementary courses in logistics and supply chain management, procurement strategies, applied computational intelligence, and social entrepreneurship.</li><li>• GPA: 8.2/10</li></ul> |

## Research and Teaching Experience

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| 2018-08-<br>Present | <b>Graduate Researcher</b><br><i>University of Florida -- Gainesville, FL, USA</i> <ul style="list-style-type: none"><li>• Expert in modeling the light coming from interstellar regions in cosmological hydrodynamical simulations. This allows for galaxy evolution studies, and Line Intensity Mapping observation modeling and forecasts;</li><li>• Developed new methods for improving the 3-point correlation function analysis in galaxy surveys such as DESI;</li><li>• Worked on one of Euclid's galaxy cluster detection pipeline, and applied it to Spitzer data to find high-redshift clusters.</li></ul> |
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| 2021-01 –<br>2021-12 | <b>Teaching Assistant</b><br><i>University of Florida -- Gainesville, FL, USA</i> <ul style="list-style-type: none"> <li>• <b>Spring 2021, Class: Discover the Universe</b> – Assisted undergraduate students with different backgrounds in various activities, projects and discussion forums for introductory Astronomy.</li> <li>• <b>Fall 2021, Class: Observational Techniques</b> – 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.</li> </ul> |
| 2018-07 –<br>2018-08 | <b>Board of Education (BOE) Fellow</b><br><i>University of Florida -- Gainesville, FL, USA</i> <ul style="list-style-type: none"> <li>• Participated in professional development workshops, graduate seminar, and academic writing classes;</li> <li>• Performed completeness and purity tests on one of the Euclid’s algorithms for finding galaxy clusters.</li> </ul>  |
| 2016-03 –<br>2018-04 | <b>Graduate Researcher</b><br><i>Federal University of Rio de Janeiro – Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"> <li>• Conducted a theoretical study on how to optimize survey strategies in order to measure peculiar velocity fields with Type Ia supernovae;</li> <li>• Helped develop the Type Ia supernova detection pipeline for J-PAS/J-PLUS surveys.</li> </ul>  |
| 2015-09 –<br>2016-02 | <b>Physics Teacher</b><br><i>INVEST Course – Rio de Janeiro. RJ, Brazil</i> <ul style="list-style-type: none"> <li>• Helped low-income students get into accredited universities by teaching them physics once a week as a volunteer.</li> </ul>  |
| 2012-08 –<br>2012-11 | <b>Mathematics Tutor and Advisor</b><br><i>Colégio PH (Elementary, Middle and High school) – Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"> <li>• Tutored students ages 11 to 22 in Mathematics;</li> <li>• Supported the educational development of students ranging from Elementary to High School and beyond;</li> <li>• Helped 200+ students get into accredited Universities tutoring and giving guidance.</li> </ul>   |
| 2011-09 –<br>2012-09 | <b>Undergraduate Researcher</b><br><i>Pontifical Catholic University of Rio de Janeiro – Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"> <li>• Undergraduate research on the development of nanocomposites with negative thermal expansion.</li> </ul>  |

## Professional Service

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| 2021 –<br>present | <b>Newsletter and Press Release Committee</b><br><i>Department of Astronomy, University of Florida</i> |
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## Publications

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| 2022 | <b>Improving the Line of Sight for the Anisotropic 3-Point Correlation Function of Galaxies: Centroid and Unit-Vector-Average Methods Scaling as <math>O(N^2)</math> – <i>MNRAS</i></b> |
| 2020 | <b>On the amount of peculiar velocity field information in supernovae from LSST and beyond – <i>Physics of the Dark Universe</i></b>  |
| 2020 | <b>Ad Astra Academy: Using Space Exploration to Promote Student Learning and Motivation in the City of God, Rio de Janeiro, Brazil – <i>CAP Journal</i></b>                             |
| 2019 | <b>J- PLUS: The Javalambre Photometric Local Universe Survey – <i>A&amp;A</i></b>   |

## Community Involvement and Interests

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| 2015 –<br>present | <b>Ad Astra Academy</b> – Educational outreach and documentary project whose objective is to inspire disadvantaged students to discover opportunities through science and exploration. Website: <a href="http://adastra.world">adastra.world</a>            |
| 2017 –<br>present | <b>AstroTubers</b> – 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: <a href="https://youtube.com/astrotubers">youtube.com/astrotubers</a> |

## Industry Employment History

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| 2015-08–<br>2016-02 | <b>Finance Analyst</b><br><i>Royal Dutch Shell – Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"><li>• Brazil's local responsible for Shell Lubricants' Global Key Accounts;</li><li>• Developed automated tools to calculate finance numbers, produce reports, and monitor business performance;</li><li>• Led improvements on Lubricants management information tools for more fit for purpose processes.</li></ul>   |
| 2015-04–<br>2015-08 | <b>Pricing Strategy Consultant</b><br><i>Hyper Consulting Company – Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"><li>• Participated in operational and strategic pricing analysis projects for Coca-Cola.</li></ul>  |
| 2013-08–<br>2015-02 | <b>Finance Intern</b><br><i>Royal Dutch Shell – Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"><li>• Interfaced with business and Brazil's Lubricants team to produce reports and monitor performance;</li><li>• Created automated tools to calculate commissions (+USD 0.5MM) paid to Shell Lubricants' Global Key Accounts, and monitor their performance in Brazil;</li><li>• Developed and implemented a graphical reporting tool that provides customized data related to volume of sales, costs, revenue and profit margins.</li></ul> |
| 2013-07–<br>2013-08 | <b>Facilities &amp; Supply Management Intern</b><br><i>Vale S.A. -- Rio de Janeiro, RJ, Brazil</i> <ul style="list-style-type: none"><li>• Served as maintenance liaison &amp; food catering supply coordinator at a multinational: one of the largest logistics operators in Brazil;</li><li>• Provided support and input to the development of work plans needed for negotiation and bid analysis.</li></ul>   |