Carlos Roberto de Melo Carneiro

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RESEARCH INTERESTS

My research interests span the areas of strong gravitational lensing, stellar dynamics, galaxy evolution, and cosmology. I am particularly focused on combining strong gravitational lensing and stellar dynamics to probe the mass structure of the lens galaxy, and how can we use this information to learn about galaxy evolution and cosmology. I am also interested in learning new methodologies that can help with this task, such as new statistical tools and the use of hydrodynamical simulations.

EDUCATION

Universidade Federal do Rio Grande do Sul - UFGRS — Porto Alegre, Brazil
PhD in Astrophysics — August/2021 - Current
Strong Gravitational Lensing and Stellar Dynamics: A Tale
Advisors: Cristina Furlanetto & Ana Chies Santos

Institute of Cosmology and Gravitation - ICG — Portsmouth, UK
PhD internship in Astrophysics — April/2024 - September/2024
Advisor: Thomas Collett

Universidade Federal do Rio Grande do Sul - UFGRS — Porto Alegre, Brazil
MSc in Astrophysics — August/2019 - August/2021
Testing General Relativity at Galactic Scales
Advisors: Cristina Furlanetto & Ana Chies Santos

Universidade Federal de Juiz de Fora - UFJF — Juiz de Fora, Brazil
BSc in Physics — March/2015 - July/2019
Cosmological Models of accelerated expansion: Structure Formation and Event Horizon (portuguese only)
Advisor: Gil de Oliveira Neto

ACADEMIC HONOURS

2021-	PhD research fellowship granted by CNPq
2024/04-2024/10	PDSE-Print international research fellowship granted by CAPES
2019-2021	Master research fellowship granted by CNPq
2018-2019	Undergraduate research fellowship granted by UFJF
2016-2017	Undergraduate research fellowship granted by FAPEMIG

PUBLICATIONS

1. **Melo-Carneiro C. R.**, et al., *Unveiling a 30 Billion Solar Mass Black Hole at the Centre of the Cosmic Horseshoe Gravitational Lens* - to be submitted.
2. **Melo-Carneiro C. R.**, Furlanetto C., Chies-Santos A. L., *Systematics in ETG Mass Profile Modelling: Strong Lensing & Stellar Dynamics*, arXiv e-prints (2024), p.arXiv:2407.02297 - accepted for publication in JCAP.
3. **Melo-Carneiro C. R.**, Furlanetto C., Chies-Santos A. L., *Probing general relativity in galactic scales at* $z \sim 0.3$, MNRAS (2023), 520, 1613.
4. **Melo-Carneiro C. R.**, Furlanetto C., Chies-Santos A. L., *Constraining general relativity at* $z \sim 0.3$*: MUSE Kinematics of SDP.81*, Proceedings of the International Astronomical Union 359: Galaxy Evolution and Feedback across Different Environments (2019), pp. 260–261.

SUCCESSFUL PROPOSALS

- **Testing General Relativity in Galaxy Scales,** April 2021–April 2023. Allocation time for the supercomputer Santos Dumont (SDumont) at the National Laboratory of Scientific Computation (Laboratório Nacional de Computação Científica - LNCC). Our proposal was accepted for the Standard program with a total of 2073600 AUs. This program was extended for one more year until April 2024.
- **Confirming strongly lensed galaxies with the SOAR Integral Field Spectrograph - 40h,** 2023 (Co-I). The proposal aimed to confirm the presence of strong gravitational lensing in 12 galaxy-galaxy candidate systems and three quadruple quasar candidates. Observations were conducted using the SOAR Integral Field Spectrograph (SIFS).
- **Testing General Relativity in Galaxy Scales,** April 2024–Current. Allocation time for the supercomputer Santos Dumont (SDumont) at the National Laboratory of Scientific Computation (Laboratório Nacional de Computação Científica - LNCC). Our proposal was accepted for the Standard program with a total of 2073600 AUs. This accepted proposal is a continuation of the previous project.

SCIENTIFIC TALKS and POSTERS

2024 **Measures of Luminous and Dark Matter in Galaxies Across Time at XXXII IAU General Assembly - Cape Town, South Africa**
Oral. Title: Self-consistent Modelling of Strong Gravitational Lensing and Stellar Dynamics

2024 **Strong Gravitational Lensing Science with LSST - Virtual Participation**
Poster. Title: Self-consistent Modelling of Strong Gravitational Lensing and Stellar Dynamics

2023 **European Astronomical Society Annual Meeting - Virtual Participation**
Poster. Title: Probing General Relativity in galactic scales at $z \sim 0.3$

2023 **IAUS 381: Strong Gravitational Lensing in the Era of Big Data - Otranto, Italy**
Poster. Title: Probing General Relativity in galactic scales at $z \sim 0.3$

2022 **25th annual International Conference on Particle Physics and Cosmology (COSMO'22) - Rio de Janeiro, Brazil**
Oral. Title: Does General Relativity hold in galactic scales? A test at a $z \sim 0.3$ elliptical lens galaxy.

2022 **XLV Brazilian Astronomical Society virtual meeting - Virtual Meeting**
Oral. Title: Does General Relativity hold in galactic scales? A test at a $z \sim 0.3$ elliptical lens galaxy.

2020 **IAUS 359: Galaxy Evolution and Feedback Across Different Environments (GALFEED) - Bento Gonçalves, Brazil**
Poster. Title: Constraining General Relativity at $z < 0.3$

SCHOOLS and WORKSHOPS

2024 **III Workshop on Lensing by Galaxies and Clusters**
Workshop held by the Brazilian Center for Research in Physics (CBPF, Brazil). Workshop on waek and strong lensing studies on galaxy and galaxy cluster scales; applications to cosmology and modified gravity tests.

2022 **DYNAMITE (DYnamics, Age and Metallicity Indicators Tracing Evolution)**
Workshop held by University of Western Australia (UWA, AUS). Workshop on triaxial Schwarzschild orbit-based dynamical models.

2022 **Summer School in Statistics for Astronomers XVII**
School held by Pennsylvania State University (PSU, US). Summer school on astrostatistics.

2020 **Partículas, AStropartículas, Campos e COsmologia - PASCCO**
School held by International Institute of Physics (IIP, Brazil). School of Particles, Astroparticles, Fields and Cosmology.

2020 **JWST-UFRGS Workshop**
Workshop held by Universidade Federal do Rio Grande do Sul (UFRGS, Brazil). JWST writing proposal workshop.

TEACHING EXPERIENCE

2020 Teaching assistant at undergraduate Astrophysics course: Fundamentals of Astronomy and Astrophysics, UFRGS

2018 Mentoring at undergraduate Physics course: Physics III - Electromagnetism (UFJF)

2017 Mentoring at undergraduate Mathematics course: Calculus II (UFJF)

SKILLS and LANGUAGES

Computer Skills	Python, `LaTeX`
Astronomy tools	DS9, QFitsView, `pPXF`, `MgeFit`, `JamPy`, `PyAutoLens`, `MPDAF`, `Astropy`
Other useful tools	`SciPy`, `NumPy`, `dynesty`, `emcee`, `Jupyter`, `VSCode`
Languages	Proficient in Portuguese and English.