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Education

Bachelor in Physics , <i>Federal University of Pernambuco</i> ,	2010–2013
7.94.	
Absorption of microwaves in quantum billiards	
Master in Astronomy , <i>University of São Paulo</i> .	2014–2016
Variability of LLAGNs in γ -rays in the local Universe	
PhD in Astronomy , <i>University of São Paulo</i> .	2016–2020
Gamma-ray observations of low-luminosity active galactic nuclei	
Visiting PhD , <i>Harvard-Smithsonian CfA</i> .	2019–2019
Using physical properties to associate <i>Fermi</i> -LAT blazars to their low-energy counterparts	
Visiting PhD , <i>Università degli Studi di Torino</i> .	2019–2020
Optical characterization of WISE selected blazar candidates	
Postdoc , <i>University of São Paulo / University of Würzburg</i> .	2021–ongoing
Multi-messenger observations of blazars coincident with IceCube high-energy neutrinos	

Bachelor thesis

Title: *Absorption of microwaves in quantum billiards*

Supervisor: Flávio Menezes de Aguiar

Description: In this work we solved the Helmholtz equation for a sample of 2-D infinite potential wells (quantum billiards) with different shapes: a rectangle, a circle, an annulus and an equilateral triangle. We then performed a series of experiments inducing microwaves with a vector network analyzer into 3-D copper cavities with the same shapes described above. Although these cavities being 3-D, they worked as 2-D cavities, as the high of such cavities was smaller than the wavelength of the microwaves. By applying a broad range of microwave frequencies to these cavities, we were able extract their microwave spectra, with absorption lines appearing for every single resonance frequency, and to look for extreme regimes, where the quantum billiards are not well understood.

Master thesis

Title: *Variability of LLAGNs in γ -rays in the local Universe*

Supervisor: Rodrigo Nemmen da Silva

Description: Since its launch in 2008, the Fermi Gamma-ray Space Telescope opened a new window into the extreme side of the Universe and has been observing γ -rays from astrophysical particle accelerators such as supermassive black holes in active galactic nuclei (AGN), exploding stars in the distant universe and many other phenomena. In this project, we investigated the γ -ray emission of a sample of 15 nearby low-luminosity AGNs catalogued in the Palomar nuclear spectroscopic survey based on Fermi Large Area Telescope (LAT) data. We characterized the γ -ray variability of these sources in order to constrain the nature of their high-energy processes.

PhD thesis

Title: *Exploring the extreme Universe with the Fermi Large Area Telescope*

Supervisors: Rodrigo Nemmen da Silva & Francesco Massaro

Description: PhD focused on the processes driving high energy γ -ray emission in the surroundings of supermassive black holes accreting in the RIAF mode. In the first half of the PhD, I also devoted my time to work on the dynamical mechanisms leading to millisecond pulsar formation within globular clusters.

Visiting PhD: During February 2019 and February 2020, I was a visiting PhD at the University of Turin, Italy, working with Prof. Francesco Massaro, in the project *Optical Characterization of WISE selected blazar candidates*.

Visiting PhD: During the summer of 2019 (July and August), I have been working with Dr. Raffaele D'Abrusco as a visiting PhD at the Harvard-Smithsonian Center for Astrophysics, in the project entitled *Using physical properties to associate Fermi-LAT blazars to their low-energy counterparts*.

Membership: Currently I am a full member of the *Fermi* Large Area Telescope and student member of the Cherenkov Telescope Array Collaborations.

Papers

1. **de Menezes, R.**, Cafardo, F., & Nemmen, R. 2019, MNRAS, 486, 1. Milky Way globular clusters in γ -rays: analysing the dynamical formation of millisecond pulsars (<https://ui.adsabs.harvard.edu/abs/2019MNRAS.486..851D/abstract>).
2. **de Menezes, R.**, et al. 2019, A&A, 630, A55. Optical characterization of WISE selected blazar candidates (<https://ui.adsabs.harvard.edu/abs/2019A%26A...630A..55D/abstract>).
3. Marchesini, E.J., Paggi, A., Massaro, F., Masetti, N., D'Abrusco, R., Andruchow, I., **de Menezes, R.** 2019, A&A, 631, A150. The γ -ray sky seen at X-ray energies-I. Searching for the connection between X-rays and

- γ -rays in *Fermi* BL Lac objects (<https://ui.adsabs.harvard.edu/abs/2019A%26A...631A.150M/abstract>).
4. **de Menezes, R.**, Nemmen, R., Finke, J., Almeida, I. & Rani, B. 2020, MNRAS, 492, 3. Gamma-ray observations of low-luminosity active galactic nuclei (<https://ui.adsabs.harvard.edu/abs/2020MNRAS.492.4120D/abstract>).
 5. **de Menezes, R.**, et al. 2020, A&SS, 365, 1. Optical spectroscopic observations of gamma-ray blazar candidates. X. Results from the 2018–2019 SOAR and OAN-SPM observations of blazar candidates of uncertain type (<https://ui.adsabs.harvard.edu/abs/2020Ap%26SS.365...12D/abstract>).
 6. The *Fermi*-LAT Collaboration, 2020. The Fourth Catalog of Active Galactic Nuclei Detected by the Fermi Large Area Telescope (<https://ui.adsabs.harvard.edu/abs/2019arXiv190510771T/abstract>).
 7. **de Menezes, R.**, et al. 2020, ApJS, 248, 2. On the physical association of *Fermi*-LAT blazars with their low-energy counterparts (<https://ui.adsabs.harvard.edu/abs/2020ApJS..248...23D/abstract>).
 8. **de Menezes, R.**, et al. 2021, MNRAS, 507, 1. A study of superluminous stars with the Fermi Large Area Telescope (<https://ui.adsabs.harvard.edu/abs/2021MNRAS.507..680D/abstract>).

Advanced schools and events

XVII IAG/USP Advanced school on astrophysics: 3D Spectroscopy & Spectral Synthesis , Campos do Jordão, Brazil.	2015
Advanced school on spectral fitting, reduction and analysis techniques.	
Fermi Summer School , Lewes, Delaware, USA.	2016
Introductory school on Fermi Science Tools and gamma-ray data analysis.	
São Paulo School of Advanced Science on High Energy and Plasma Astrophysics in the CTA Era (SPSAS-HighAstro) , São Paulo, Brazil.	2017
Participant and contributor to the Local Organizing Committee.	
Cherenkov Telescope Array Rio Meeting , Centro Brasileiro de Pesquisas Físicas, Rio de Janeiro, Brazil.	2017
Meeting focused on the instruments and key science projects of the Cherenkov Telescope Array.	
48th Saas-Fee course: Black hole formation and growth , Saas-Fee, Switzerland.	2018
Poster presentation about my work with unassociated gamma-ray sources.	
Fermi Collaboration Meeting , Washington DC, USA.	2018
Oral presentation of my work regarding the gamma-ray emission of low-luminosity active galactic nuclei.	
8th Fermi Symposium , Baltimore, USA.	2018
Poster presentation of my work about the formation of gamma-ray millisecond pulsars in globular clusters.	
Spring Fermi Collaboration Meeting , Bled, Slovenia.	2019

Oral presentation about my work on the gamma-ray emission from low-luminosity active galactic nuclei.

CTA 1st Science Symposium, Bologna, Italy. 2019

Poster presentation about my work on the gamma-ray emission from low-luminosity active galactic nuclei.

The 3C Extragalactic Radio Sky: Legacy of the Third Cambridge Catalogue, Turin, Italy. 2019

Member of the Local Organizing Committee.

37th International Cosmic Ray Conference, Berlin (remote meeting), Germany. 2021

Published PoS entitled "Multi-Messenger observations of the Fermi-LAT blazar 4FGL J0658. 6+ 0636 consistent with an IceCube high-energy neutrino" (<https://pos.sissa.it/395/955>).

Experience with telescopes

Perkin-Elmer Telescope - Pico dos Dias, 1.6m. 2015

One week collecting photometric and spectroscopic data as part of MSc credits.

Southern Astrophysical Research Telescope (SOAR), 4.1m. 2019

Two nights collecting optical spectra for γ -ray blazars. Data published in paper 5 (see §Papers).

Languages

Portuguese: Native speaker *Mother tongue*

English: Fluent *TOEFL ITP: 547*

Italian: Moderate speaker

Computer skills

Programming languages

Basic: C, C++ *Bachelor*

Advanced: Python *MSc and PhD*

Astronomy tools

Familiar with: IRAF, TOPCAT, *Fermi* Tools *MSc and PhD*

Awards and honors

Honorable mention. 2021

CAPES National prize on the best PhD theses in Brazil, 2021 edition.