Gabriel Teixeira

PhD Candidate

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Education

Centro Brasileiro de Pesquisas Físicas, CBPF — *Rio de Janeiro, Brazil*

Doctorate in Physics — *Mar. 2022 - On going*

- **Research Interest**: Astrophysics, Time-Domain Astronomy, Large Scale Structure, Data Science, Deep Learning.

Universidade Federal do Rio de Janeiro, UFRJ — *Rio de Janeiro, Brazil*

Bachelor of Physics — *Mar. 2018 - Mar. 2022*

- Magna Cum Laude - Grade 9.1/10;

Publications[1]

⋆ **Teixeira** et al. (2025). SN 2022acko and the Properties of its Red Supergiant Progenitor: Direct Detection, Light Curves, and Nebular Spectroscopy. Accepted for publication in The Astrophysical Journal, 1st December 2025.
https://doi.org/10.48550/arXiv.2509.04707

⋆ **Teixeira** et al. (2024). Photometric redshifts probability density estimation from recurrent neural networks in the DECam local volume exploration survey data release 2. Astronomy and Computing, 100886.
https://doi.org/10.1016/j.ascom.2024.100886

⋆ Bom et al. (2024). A dark standard siren measurement of the Hubble constant following LIGO/Virgo/KAGRA O4a and previous runs. Monthly Notices of the Royal Astronomical Society, 535(1), 961–975.
https://doi.org/10.1093/mnras/stae2390

- Méndez-Hernández, et al. (2025). Targeting cluster galaxies for the 4MOST CHANCES Low-z sub-survey with photometric redshifts. Accepted for publication in Astronomy and Astrophysics.
https://doi.org/10.1051/0004-6361/202556796

- Alfradique et al. (2024). A dark siren measurement of the Hubble constant using gravitational wave events from the first three LIGO/Virgo observing runs and DELVE. Monthly Notices of the Royal Astronomical Society, 528(2), 3249–3259.
https://doi.org/10.1093/mnras/stae086

- Sifón et al. (2024). CHANCES, The Chilean Cluster Galaxy Evolution Survey: selection and initial characterization of clusters and superclusters. Astronomy and Astrophysics, Volume 697.
https://doi.org/10.1051/0004-6361/202452710

- Lima et al. (2022). Photometric redshifts for the S-PLUS Survey: Is machine learning up to the task? Astronomy and Computing, 38, 100510.
https://doi.org/10.1016/j.ascom.2021.100510

- Zuntz et al. (2021). The LSST-DESC 3x2pt Tomography Optimization Challenge. The Open Journal of Astrophysics, 4.
https://doi.org/10.21105/astro.2108.13418

- Almeida-Fernandes et al. (2022). Data Release 2 of S-PLUS: Accurate template-fitting based photometry covering $\sim$1000 deg^2 in 12 optical filters. Monthly Notices of the Royal Astronomical Society, 511(3), 4590–4618.
https://doi.org/10.1093/mnras/stac284

- Darc et al. (2025). Symbolic Regression Is All You Need: From Simulations to Scaling Laws in Binary Neutron Star Mergers. In 39th Annual Conference on Neural Information Processing Systems: Machine Learning and

[1] ⋆ denotes selected key publications.

the Physical Sciences (ML4PS).
https://doi.org/10.48550/arXiv.2511.08784

- Baier-Soto, et al. The Role of Supercluster Filaments in Shaping Galaxy Clusters. Astronomy and Astrophysics, Accepted 05 October 2025.
https://doi.org/10.1051/0004-6361/202556957

- Muller et al. (2022). Complete identification of complex salt geometries from inaccurate migrated subsurface offset gathers using deep learning. Geophysics, 87(6), R453–R463.
https://doi.org/10.1190/geo2021-0586.1

Research Experience

LAB-IA - CBPF Laboratory of Artificial Intelligence for Physics

PhD Thesis *2022 – Ongoing*

- Developed neural networks for photometric redshift probability estimation in galaxy surveys
- Provided photometric redshifts used in dark siren measurements of the Hubble constant
- Contributed to the identification of complex salt geometries from seismic data using deep learning
- Worked on supernova characterization using photometric and spectroscopic data
- Explored Physics-Informed Neural Networks (PINNs) for modeling supernova light curves

Université Clermont Auvergne, FR

Visiting Student *Oct. 2025 - Ongoing*

- Engaged in Bayesian inference for transient modeling in time-domain astronomy
- Developing Physics-Informed Neural Networks for probabilistic density estimation and model constraints

FINK Broker Collaboration

Member *2025 – Ongoing*

- Developing Physics Informed Neural Networks framework for modeling LSST alerts light curves

NEWFIRM Infrared Survey for Transients

Collaborator *2024 – Ongoing*

- Observed and conducted transient searches using the NEWFIRM instruments

CIERA - Northwestern University, US

Visiting Student *Aug. 2024 - Oct. 2024*

- Engaged in observational data analysis and interpretation of Type-II supernovae

CHANCES - The Chilean Cluster Galaxy Evolution Survey

Builder *2023 - ongoing*

- Developed photometric redshifts catalogs for clusters target selection using neural networks

Laboratório Nacional de Computação Científica + Lemobs

Collaborator *Mar. 2022 - Dec. 2022*

- Designed an advanced algorithm utilizing state-of-the-art Transformer-based NLP models for classifying phrases describing medical conditions

DELVE - The DECam Local Volume Exploration Survey

Member *2021 - ongoing*

- Developed neural networks for photometric redshift estimation in galaxy catalogs
- Collaborated on the creation of a deep learning-based galaxy morphology catalog

S-PLUS - The Southern Photometric Local Universe Survey

Member *2020 - ongoing*

- Collaborated on the development of neural networks for photometric redshift estimation in galaxy catalogs
- Research team member of the S-PLUS Transient Extension Program (STEP)
- Organizing committee member for the S-PLUS general meeting in 2024

Centro brasileiro de Pesquisas Físicas, CBPF *Rio de Janeiro, Brazil*

Research Intern *2020 - 2022*

- Developed Deep Learning models to estimate photometric redshifts for observed galaxies from differents Surveys;
- Developed Deep Learning models to classify diagnostic images to help detect COVID-19;
- Developed Deep Learning models to segmentation, delimiting salt inclusions from seismic migrated images;
- Research project funded by Petrobras.

Teaching Experience

Universidade Federal do Rio de Janeiro, UFRJ — *Rio de Janeiro, Brazil*

ADJUNCT PROFESSOR — *Mar. 2023 - Oct. 2024*

- Taught Basic Physics classes to undergraduate students.

Fundação Centro de Ciências e Educação Superior a Distância do Estado do Rio de Janeiro, CECIERJ — *Rio de Janeiro, Brazil*

TEACHER — *Mar. 2020 - Feb. 2022*

- Taught physics classes to high school students, preparing them for the Brazilian National Exam (ENEM).

Universidade Federal do Rio de Janeiro, UFRJ — *Rio de Janeiro, Brazil*

TEACHER ASSISTANT — *Feb. 2019 - Dec. 2021*

- Experimental Physics I (Feb. 2019 - Dec. 2019)
- Computational Methods for Theoretical Physics (Feb. 2020 - Dec. 2021)
- Classical Mechanics (Mar. 2021 - Jun. 2021).

Organizing Committees

- **LSST Transients Workshop** (Brazil, 2025)
- **Artificial Intelligence in Physics Module at *VIII Escola Avançada de Física Experimental - CBPF*** (Brazil, 2025)
- **Artificial Intelligence in Physics Module at *XV Escola do CBPF de Física Teórica*** (Brazil, 2025)
- **Hack4Dev CubeSats Challenge** (Brazil, 2025)
- **19th S-PLUS Collaboration Meeting** (Brazil, 2024)
- **Artificial Intelligence in Physics Module at *VI Escola Avançada de Física Experimental - CBPF*** (Brazil, 2023)
- **V Physics Week - UFRJ** (Brazil, 2019)

Talks

- *Invited Speaker* | **V Semana Academica de Física (UNIFESSPA)** – O Papel da IA na Exploração do Universo (Brazil, 2025)
- *Invited Lecturer* | **XI La Plata International School (LAPIS) on Astronomy and Geophysics** – Galaxy Morphology Classification in S-PLUS Images with Deep Learning (Argentina, 2025)
- *Seminar* | **National Observatory** – From Large-Scale Structure to Time-Domain Astronomy: Data Analysis and Machine Learning in Astrophysics (Brazil, 2025)
- *Seminar* | **Laboratoire de Physique de Clermont Auvergne** – On the Hunt and Analysis of Astronomical Transients (France, 2025)
- *Seminar* | **Dipartimento di Fisica "Ettore Pancini"** – On the use of Deep Leaning in Astrophysics (Italy, 2025)
- *Seminar* | **S-PLUS Bi-Weekly Meeting**" – Physics Informed Neural Network for Astronomical Transients Modeling (Online, 2025)
- **IN2P3/IRFU Machine Learning workshop 2025** – Physics-Informed Neural Networks for Astronomical Time-Series Analysis (France, 2025)
- **Rubin LSST-France** – Early Inference of Supernova Light Curve Parameters with Physics-Informed Neural Networks (France, 2025)
- **OzFink Workshop** – Early Inference of Supernova Light Curve Parameters with Physics-Informed Neural Networks (Australia, 2025)
- **LSST Transients Workshop** – Physics-Informed Neural Networks for Supernova Light Curves: The Case of SN 2022acko (Brazil,2025)
- **3rd CHANCES General Meeting** – Full Probability Density Estimation of Photometric Redshifts for Target Selection in CHANCES (Chile, 2024)
- **2nd CHANCES Team Meeting** – Developing Photometric Redshifts Using DECam Data for Target Selection in CHANCES (Chile, 2024)
- **Fink-Brazil Workshop** – Supernova 2022acko and Progenitor Star Properties: Detection and Light Curves (Brazil, 2024)
- **S-PLUS Collaboration Meeting** – The S-PLUS Transient Extension Program (STEP) (Brazil, 2024)
- *Outreach* | **CIERA Astronomer Evenings** – How to Identify the Structure of the Universe (United States, 2024)
- **18th S-PLUS Collaboration Meeting** – Supernova 2022acko and Progenitor Star Properties with STEP (Brazil, 2023)
- **Annual Meeting of the Brazilian Astronomical Society (SAB)** – Supernova 2022acko and Progenitor Star Properties (Brazil, 2023)
- **First Rio Dark Matter Meeting** – Photometric Redshifts Probability Density Estimation from Recurrent Neural Networks in the DECam Local Volume Exploration Survey DR2 (Brazil, 2023)

Complementary Formation

- *Mini-Course* | **Dark Matter and Galaxy Rotation** (Brazil, 2025)
- *School* | **11th International School on Deep Learning** (Portugal, 2024)
- *School* | **Giambiagi Winter School on Cosmology** (Argentina, 2023)

Skills

Soft Skills

- Science communication
- Project management
- Experienced teacher
- Collaborative work in large research teams
- Fast learner

Technical Skills

- Python (advanced)
- Deep learning frameworks (advanced): `PyTorch`, `TensorFlow`
- Git and GitHub (intermediate)
- C and C++ (intermediate)
- docker (intermediate)