

Níckolas de Aguiar Alves

PhD student in physics







Federal University of ABC

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Education

- 2023 – Ongoing  **Doctor in Physics**
Federal University of ABC (UFABC), Santo André, São Paulo, Brazil
Advisor: André G. S. Landulfo 
- 2021 – 2023  **Master in Physics**
Federal University of ABC (UFABC), Santo André, São Paulo, Brazil
Advisor: André G. S. Landulfo 
Thesis: *Nonperturbative Aspects of Quantum Field Theory in Curved Spacetime*
- 2017 – 2021  **Bachelor in Physics**
Institute of Physics, University of São Paulo (IFUSP), São Paulo, São Paulo, Brazil
Advisor: João C. A. Barata 

Academic Publications

Papers and Preprints

- 1 **N. Aguiar Alves** and A. G. S. Landulfo. “The sky as a Killing horizon”. (2025). arXiv: [2504.12514](https://arxiv.org/abs/2504.12514) [gr-qc]. Submitted.
- 2 **N. Aguiar Alves** and B. A. Costa. “The Measure of a Mass”. (2025). Essay written for the Gravity Research Foundation 2025 Awards for Essays on Gravitation. arXiv: [2503.18963](https://arxiv.org/abs/2503.18963) [gr-qc]. Pre-published.
- 3 **N. Aguiar Alves**, A. G. S. Landulfo, and B. A. Costa. “Positive mass in general relativity without energy conditions”. *Physical Review D* **111**, 044027 (2025). arXiv: [2408.00154](https://arxiv.org/abs/2408.00154) [gr-qc].




Other Works

- 1 **N. Aguiar Alves**. *Lectures on the Bondi–Metzner–Sachs group and related topics in infrared physics*. 2025. arXiv: [2504.12521](https://arxiv.org/abs/2504.12521) [gr-qc]. Submitted.
- 2 **N. Aguiar Alves**. “*Nonperturbative Aspects of Quantum Field Theory in Curved Spacetime*”. MSc thesis. Santo André, Brazil: Federal University of ABC, 2023. xxiv, 152 pp. arXiv: [2305.17453](https://arxiv.org/abs/2305.17453) [gr-qc].






To Appear

- 1 **N. Aguiar Alves**, C. C. Rodrigues, and G. J. Olmo. *Platypus stars: Mimicking black holes through DEC violations*. In preparation.

Funding



- 2025 – Ongoing  PhD Scholarship
São Paulo Research Foundation (FAPESP) Grant No. 2025/05161-0
Project: *The Sky as a Killing Horizon and Other Topics on the Infrared Structure of Gravity*
Advisor: André G. S. Landulfo 
- 2023 – 2025  PhD Scholarship
Coordenação de Aperfeiçoamento de Pessoal de Ensino Superior (CAPES)
Granted to pursue my PhD after placing first in UFABC’s admission ranking

Funding (continued)




- 2021 – 2023  MSc Scholarship
[São Paulo Research Foundation](#) (FAPESP) Grant No. 2021/07372-7
Project: [The Functional Renormalization Group in Quantum Field Theory in Curved Spacetimes](#)
Advisor: André G. S. Landulfo 
- 2021  MSc Scholarship
[Coordenação de Aperfeiçoamento de Pessoal de Ensino Superior](#) (CAPES)
Granted to pursue my MSc after placing first in UFABC's admission ranking
- 2019 – 2020  BSc Scholarship
[São Paulo Research Foundation](#) (FAPESP) Grant No. 2019/12158-4
Project: [Hyperbolic Equations](#)
Advisor: João C. A. Barata 

Academic Service



Conferences Organized

- 2026 (scheduled)  [Thermality in Quantum Field Theory in Curved Spacetimes](#)
Main organizer. Supported by the [ICTP South American Institute for Fundamental Research](#).
- 2023  [Golden Wedding of Black Holes and Thermodynamics](#)
Main organizer

Schools Organized

- 2025  [II São Paulo School in Gravitational Physics](#)
Main organizer. Part of [ICTP Physics Without Frontiers](#).
- 2024  [I São Paulo School in Gravitational Physics](#)
Main organizer
- 2018 – 2021  [Jayme Tiomno School in Theoretical Physics](#)
Founder and organizer of the first three editions

Miscellaneous



- 2018  [Dead Physicists Society](#)
Founded a student-driven organization still responsible for the organization of schools and seminars at IFUSP
- 2017 – Ongoing  Organized several other events, seminars, and colloquia

Scientific Societies





- 2025 – Ongoing  [Brazilian Physical Society](#)
- 2024 – Ongoing  [International Society for Quantum Gravity](#)

Teaching Experience





Minicourses and Workshops

- 2025  [Introduction to Black Hole Physics](#)
[II São Paulo School in Gravitational Physics](#)
Minicourse for early undergraduate students
- 2024  [Infrared Symmetries of General Relativity](#)
[I São Paulo School in Gravitational Physics](#)
Minicourse for advanced undergraduate and early graduate students






Teaching Experience (continued)

- 2023  Quantum Field Theory in Curved Spacetime
[Golden Wedding of Black Holes and Thermodynamics](#)
Minicourse for early graduate students
- 2021  Algebraic Methods of Theoretical Physics
[III Jayme Tiomno School in Theoretical Physics](#)
Minicourse for first-year undergraduate students on the basics of group theory and its applications to physics
- 2020  An Introduction to \LaTeX
[XV Oceanography Thematic Week](#)
Oceanographic Institute, University of São Paulo
- 2019  An Introduction to \LaTeX
[I Jayme Tiomno School in Theoretical Physics](#)

Teaching Assistant

- 2025  Advanced Topics in General Relativity
Institute of Physics, University of São Paulo
Graduate-level course
- 2024  Electromagnetic Phenomena
Federal University of ABC
Undergraduate-level course covering introductory electrodynamics
- 2021  Classical Mechanics II
Federal University of ABC
Undergraduate-level course covering analytical mechanics
- 2019  Mathematical Physics I
Institute of Physics, University of São Paulo
Undergraduate-level course covering introductory Fourier analysis

Outreach and Miscellanea

- 2025  [International Young Physicists Tournament \(Brazil\)](#)
Juror for the final stage of the 2025 edition of the IYPT Brazil.
-  [V ICTP-SAIFR Summer School for Young Physicists](#)
Tutored a course on black hole physics for high school students
- 2023 – Ongoing  [gravitonick](#)
YouTube channel discussing advanced physics topics aimed at undergraduate students
- 2018 – Ongoing  [Physics Stack Exchange](#)
Active contributor to the Physics Stack Exchange Q&A website
Most prolific contributor to the [qft-in-curved-spacetime](#) tag
- 2018 – 2020  Informal office hours
Institute of Physics, University of São Paulo
Hosted “informal office hours” twice a week for first-year students