

# Níckolas de Aguiar Alves

PhD candidate in physics







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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. “Null infinity as a Killing horizon”. *Physical Review D* **112**, 065017 (2025). arXiv: [2504.12514](https://arxiv.org/abs/2504.12514) [gr-qc].
- 2 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 and B. A. Costa. *The Measure of a Mass*. Essay written for the Gravity Research Foundation 2025 Awards for Essays on Gravitation. 2025. arXiv: [2503.18963](https://arxiv.org/abs/2503.18963) [gr-qc].
- 3 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: Exotic compact objects supported by vacuum pressure*. 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     Topics in Celestial Holography  
Institute of Physics, University of São Paulo  
Graduate-level course
-  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