

Níckolas de Aguiar Alves

PhD candidate in physics

Federal University of ABC

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Education

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| 2023– |  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: <i>Nonperturbative Aspects of Quantum Field Theory in Curved Spacetime</i> |
| 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

- 1 **N. Aguiar Alves**. “Lectures on the Bondi–Metzner–Sachs group and related topics in infrared physics”. *Eur. Phys. J. C* (2026). arXiv: [2504.12521 \[gr-qc\]](https://arxiv.org/abs/2504.12521). In press.
- 2 **N. Aguiar Alves** and A. G. S. Landulfo. *Sound as a gauge theory and its infrared triangle*. 2025. arXiv: [2512.15796 \[hep-th\]](https://arxiv.org/abs/2512.15796). Pre-published.
- 3 **N. Aguiar Alves** and A. G. S. Landulfo. “Null infinity as a Killing horizon”. *Phys. Rev. D* **112**, 065017 (2025). arXiv: [2504.12514 \[gr-qc\]](https://arxiv.org/abs/2504.12514).
- 4 **N. Aguiar Alves** and B. A. Costa. *The Measure of a Mass*. 2025. arXiv: [2503.18963 \[gr-qc\]](https://arxiv.org/abs/2503.18963). Pre-published.
- 5 **N. Aguiar Alves**, A. G. S. Landulfo, and B. A. Costa. “Positive mass in general relativity without energy conditions”. *Phys. Rev. D* **111**, 044027 (2025). arXiv: [2408.00154 \[gr-qc\]](https://arxiv.org/abs/2408.00154).
- 6 **N. Aguiar Alves**. “*Quantum Field Theory in Curved Spacetime. An Introduction*”. Unpublished lecture notes. 2023.
- 7 **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 \[gr-qc\]](https://arxiv.org/abs/2305.17453).

To Appear

- 1 **N. Aguiar Alves**, C. C. Rodrigues Evangelista, G. J. Olmo, and D. Rubiera-Garcia. *Platypus stars: Exotic compact objects supported by vacuum pressure*. In preparation.
- 2 C. C. Rodrigues Evangelista and **N. Aguiar Alves**. “Using thermodynamics to learn gravitational wave physics”. *Eur. J. Phys.* Forthcoming.

Funding

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| 2025– |  PhD Scholarship
The Sky as a Killing Horizon and Other Topics on the Infrared Structure of Gravity
São Paulo Research Foundation (FAPESP) Grant No. 2025/05161-0
Advisor: André G. S. Landulfo  |
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Funding (continued)

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| 2023–2025 | ■ PhD Scholarship
Coordenação de Aperfeiçoamento do Pessoal de Ensino Superior (CAPES)
Granted to pursue my PhD after placing first in UFABC's admission ranking |
| 2021–2023 | ■ MSc Scholarship
The Functional Renormalization Group in Quantum Field Theory in Curved Spacetimes
São Paulo Research Foundation (FAPESP) Grant No. 2021/07372-7
Advisor: André G. S. Landulfo  |
| 2021 | ■ MSc Scholarship
Coordenação de Aperfeiçoamento do Pessoal de Ensino Superior (CAPES)
Granted to pursue my MSc after placing first in UFABC's admission ranking |
| 2019–2020 | ■ BSc Scholarship
Hyperbolic Equations
São Paulo Research Foundation (FAPESP) Grant No. 2019/12158-4
Advisor: João C. A. Barata  |

Academic Service

Conferences Organized

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| 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

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| 2024– | ■ São Paulo School in Gravitational Physics
Main organizer
Part of ICTP Physics Without Frontiers (second edition onward) |
| 2018–2021 | ■ Jayme Tiomno School in Theoretical Physics
Founder and organizer of the first three editions |

Scientific Societies

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| 2025– | ■ Brazilian Physical Society |
| 2024– | ■ International Society for Quantum Gravity |

Teaching Experience

Minicourses and Workshops

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| 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 |
| 2023 | ■ Quantum Field Theory in Curved Spacetime
Golden Wedding of Black Holes and Thermodynamics
Minicourse for early graduate students |

Teaching Experience (continued)

- 2021  Algebraic Methods of Theoretical Physics
[III Jayme Tiomno School in Theoretical Physics](#)
Minicourse on group theory in physics for first-year undergraduate students
- 2020  An Introduction to L^AT_EX
[XV Oceanography Thematic Week](#)
Oceanographic Institute, University of São Paulo
- 2018  An Introduction to L^AT_EX
[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

Participation in Panels

- 2026  VI ICTP-SAIFR Summer School for Young Physicists
Panel with graduate students in physics

Outreach and Miscellanea

-  VI ICTP-SAIFR Summer School for Young Physicists
Tutored a course on black hole physics for high school students
- 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
- 2018–  Physics Stack Exchange
Active contributor to the Physics Stack Exchange Q&A website
Most prolific contributor to the `qft-in-curved-spacetime` tag