




Níckolas de Aguiar Alves

PhD student in theoretical physics
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Education

- 2023 – Ongoing  **Doctor in Physics**
Federal University of ABC, SP, Brazil
Advisor: Dr. André G. S. Landulfo
- 2021 – 2023  **Master in Physics**
Federal University of ABC, SP, Brazil
Advisor: Dr. 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, SP, Brazil
Advisor: Dr. João C. A. Barata

Academic Publications

Journal Articles

- 1 **N. de Aguiar Alves**, A. G. S. Landulfo, and B. A. Costa. “Positive Mass in General Relativity Without Energy Conditions”. *Physical Review D* (2025). arXiv: [2408.00154 \[gr-qc\]](#). Forthcoming.



To Appear

- 1 **N. de Aguiar Alves**. “Measurements Are Never Relative”. Submitted.
- 2 **N. de Aguiar Alves**, A. G. S. Landulfo, and A. D. Pereira. “Nonperturbative Renormalization Group Flow for a Particle Detector”. In preparation.



Other

- 1 **N. de Aguiar Alves**. *Lectures on the Bondi–Metzner–Sachs Group and related topics in infrared physics*. 2025. In preparation.
- 2 **N. de 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 \[gr-qc\]](#).

Funding

- 2023 – Ongoing  **PhD Scholarship**
Coordenação de Aperfeiçoamento do Pessoal de Ensino Superior (CAPES), Social-Demand Program
Granted to pursue my PhD degree after placing first in UFABC’s admission ranking
- 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: Dr. André G. S. Landulfo

Funding (continued)



- 2021  MSc Scholarship
Coordenação de Aperfeiçoamento do Pessoal de Ensino Superior (CAPES), Social-Demand Program
Granted to pursue my MSc degree 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: Dr. João C. A. Barata

Academic Service



Conferences Organized

- 2023  [Golden Wedding of Black Holes and Thermodynamics](#)
Main organizer

Schools Organized

- 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  Several other events, seminars, and colloquia

Scientific Societies

- 2024 – Ongoing  [International Society for Quantum Gravity](#)
Ordinary member




Teaching Experience

Minicourses and Workshops




- 2024  Infrared Symmetries of General Relativity
[I São Paulo School in Gravitational Physics](#)
- 2023  Quantum Field Theory in Curved Spacetime
[Golden Wedding of Black Holes and Thermodynamics](#)
- 2021  Algebraic Methods of Theoretical Physics
[III Jayme Tiomno School in Theoretical 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 Experience (continued)

Teaching Assistant



- 2024  Electromagnetic Phenomena
Federal University of ABC, SP, Brazil
Undergraduate-level course covering introductory electrodynamics
Hosted weekly office hours
- 2021  Classical Mechanics II
Federal University of ABC, SP, Brazil
Undergraduate-level course covering analytical mechanics
Hosted weekly office hours
- 2019  Classical Mechanics II
Institute of Physics, University of São Paulo, SP, Brazil
Undergraduate-level course covering introductory Fourier analysis
Hosted office hours twice a week

Miscellaneous



- 2023 – Ongoing  gravitonick
<https://www.youtube.com/@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
Hosted “informal office hours” twice a week for first-year students at IFUSP

Research Presentations

Contributed Talks


- 2024  Positive mass in general relativity without energy conditions
 - XLVII [Paulo Leal Ferreira Congress](#) (São Paulo State University, São Paulo, Brazil)
- 2023  Nonperturbative renormalization group flow for a particle detector
 - [Golden Wedding of Black Holes and Thermodynamics](#) (online conference)

Poster Presentations



- 2024  Negative masses are unstable and we don't need energy conditions to prove it
 - [Witnessing Quantum Aspects of Gravity in a Lab](#) (Principia Institute, São Paulo, Sep. 23–27, 2024)
- 2023  Nonperturbative aspects of quantum field theory in curved spacetime
 - [Interfaces Between Quantum and Classical Statistical Mechanics](#) (University of São Paulo's Institute of Mathematics and Statistics, Jul. 24–28 2023)
 - [V Jayme Tiomno Physics School](#) (University of São Paulo's Institute of Physics, Sep. 4–8, 2023)
 - XLVI [Paulo Leal Ferreira Congress](#) (São Paulo State University's Institute of Theoretical Physics, Oct. 24–27, 2023)

Research Presentations (continued)

Flash Talks

- 2023 – 2024
-  Nonperturbative renormalization group flow for a particle detector
- [School on Phase Transitions and Gravitational Waves](#) (Federal University of Rio Grande do Norte’s International Institute of Physics, Mar. 4–8, 2024)
 - [Quantum Spacetime and the Renormalization Group 2023](#) (Sant’Elmo Beach Hotel, Oct. 2–6, 2023)

Miscellaneous

- Languages
-  Portuguese (native speaker), English (fluent), Italian (basic)
- Digital Skills
-  \LaTeX , Mathematica, HTML, Python, C, ...