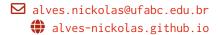
Níckolas de Aguiar Alves 💿

PhD student in theoretical physics Federal University of ABC Santo André, São Paulo, Brazil



Education

2023 – Ongoing **Doctor in Physics**

Federal University of ABC (UFABC), SP, Brazil

Advisor: Prof. André G. S. Landulfo (

2021 – 2023 **Master in Physics**

Federal University of ABC (UFABC), SP, Brazil

Advisor: Prof. 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), SP, Brazil

Advisor: Prof. João C. A. Barata @

Academic Publications

Journal Articles

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 [gr-qc].

Theses

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].

To Appear

- **11 N. Aguiar Alves**. Lectures on the Bondi–Metzner–Sachs Group and related topics in infrared physics. In preparation.
- 2 N. Aguiar Alves. Measurements Are Never Relative. In preparation.
- N. Aguiar Alves and B. A. Costa. The Measure of a Mass. In preparation.
- **N. Aguiar Alves** and A. G. S. Landulfo. *The Sky as a Killing Horizon*. In preparation.
- **N. Aguiar Alves**, A. G. S. Landulfo, and A. D. Pereira. *Nonperturbative Renormalization Group Flow for a Particle Detector*. In preparation.

Funding

2023 – Ongoing

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

São Paulo Research Foundation (FAPESP) Grant No. 2021/07372-7

Project: The Functional Renormalization Group in Quantum Field Theory in Curved

Spacetimes

Advisor: Prof. André G. S. Landulfo @

Funding (continued)

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

São Paulo Research Foundation (FAPESP) Grant No. 2019/12158-4

Project: Hyperbolic Equations Advisor: Prof. 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

Scientific Societies

2025 – Ongoing Razilian Physical Society

2024 – Ongoing International Society for Quantum Gravity

Teaching Experience

Minicourses and Workshops

2024 Infrared Symmetries of General Relativity

I São Paulo School in Gravitational Physics

10-hour-long minicourse for advanced undergraduate and early graduate students

2023 Quantum Field Theory in Curved Spacetime

Golden Wedding of Black Holes and Thermodynamics

12-hour-long minicourse for early graduate students

2021 Algebraic Methods of Theoretical Physics

III Jayme Tiomno School in Theoretical Physics

10-hour-long 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

An Introduction to Large X

I Jayme Tiomno School in Theoretical Physics

Teaching Experience (continued)

Teaching Assistant

2025 Advanced Topics in General Relativity

Institute of Physics, University of São Paulo, SP, Brazil

Graduate-level course covering advanced topics in general relativity

Office hours once a week (voluntary)

2024 Electromagnetic Phenomena

Federal University of ABC, SP, Brazil

Undergraduate-level course covering introductory electrodynamics

Office hours twice a week

2021 Classical Mechanics II

Federal University of ABC, SP, Brazil

Undergraduate-level course covering analytical mechanics

Office hours twice a week

2019 Mathematical Physics I

Institute of Physics, University of São Paulo, SP, Brazil

Undergraduate-level course covering introductory Fourier analysis

Office hours twice a week

Outreach and Miscellanea

2025 V ICTP-SAIFR Summer School for Young Physicists

Tutored a course on black hole physics for high school students

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)

Nonperturbative renormalization group flow for a particle detector

• Golden Wedding of Black Holes and Thermodynamics (online conference)

Poster Presentations

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)

Research Presentations (continued)

- 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)

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)