

Pedro Henrique Santos Bento

PH.D. STUDENT IN PHYSICS

INSTITUTE OF PHYSICS
QPEQUI RESEARCH GROUP

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EDUCATION

Universidade Federal de Goiás - UFG *Goiânia, Brazil*
Institute of Physics
PhD degree in Physics *March 2021 - Present*
Supervisor: Prof. Lucas Chibebe Céleri

Universidade Federal de Uberlândia - UFU *Uberlândia, Brazil*
Institute of Physics
Msc degree in Physics *March 2019 - February 2021*
Supervisor: Prof. Marcel Novaes
Master's Thesis: Semiclassical treatment of quantum chaotic transport with a tunnel barrier

Universidade Federal de Uberlândia - UFU *Uberlândia, Brazil*
Institute of Physics
Bachelor degree in Materials Physics *March 2015 - December 2018*

RESEARCH PROJECTS

Dynamical quantum phase transitions: thermodynamics and complexity
Supervisor: [Dr. Lucas Chibebe Céleri \(UFG\)](#) *March 2021 - Present*

This is my Ph.D. project, which I've been putting most of my efforts. It branched into two different topics:

- *Spread complexity of global quenches in quantum many-body systems:* Our goal is quantifying how complex is the quench dynamics on these systems. For that, we use a measure of how deep the wavefunction of the system after the quench spreads into the Hilbert space.
- *Thermodynamics and Dynamical phase transitions:* Our goal is studying the thermodynamics of the dynamical quantum phase transitions, that is, for example we'd like to know how much entropy a quench process produces.

Semiclassical approach to the quantum transport in chaotic systems
Supervisor: [Dr. Marcel Novaes \(UFU\)](#) *March 2019 - Present*

I started working in this project in my master and it concerns the quantum transport in chaotic systems with tunnel barriers. More specifically, we're thinking of a 2D electron gas being transported in a mesoscopic cavity coupled to two or more waveguides. We model a non-ideal coupling between the cavity and the waveguides using tunnel barriers. We have calculated many transport quantities such as conductance and shot-noise using a semiclassical approach. You can find these results in the papers [1-3] listed below.

PRIZES

2022 Outstanding student from UFG's graduation program in physics.

PUBLICATION LIST

1. Lucas H Oliveira, Pedro H. S. Bento, Marcel Novaes, *Exponentially small quantum correction to conductance* J. Phys. A: Math. Theor. **55** 415302 (2022).
2. Lucas H. Oliveira, Pedro H. S. Bento, Marcel Novaes, *Quantum transport in chaotic cavities with tunnel barriers*, Phys. Rev. B **105**, 235423 (2022).
3. Pedro H. S. Bento, Marcel Novaes, *Semiclassical treatment of quantum chaotic transport with a tunnel barrier*, J. Phys. A: Math. Theor. **54** 125201 (2021).

TECHNICAL SKILLS

Programming languages: Python (Numpy, Scipy, Sympy and Matplotlib), Julia, Mathematica and \LaTeX .

PARTICIPATION IN SCIENTIFIC CONFERENCES

2022, Oral presentation, V Workshop of Graduate Program in Physics from UFG, Goiânia-GO, Brazil.
2020, Oral presentation, XLIII Paulo Leal Ferreira Congress in Physics, São Paulo-SP, Brazil.
2018, Poster, VIII UFU's scientific initiation and technology week, Uberlândia-MG, Brazil.
2018, Oral presentation, XI UFU's physics week, Uberlândia-MG, Brazil.

EXPERIENCE AND HOBBIES

I am the current organizer of [QPequi Talks](#), a series of virtual talks provided by QPequi.

Hobbies: Dancing, singing, chatting and cooking.