João Paulo Cavalcante

Curriculum Vitae

Personal Information

Date of birth 27 July 1993
Place of birth Gravatá, Pernambuco (PE), Brazil
Citizenship Brazilian

Education

2019– **PhD in Physics**, *Federal University of Pernambuco, Pernambuco, Brazil.*

Title *Isomonodromy Method and Black Holes Quasinormal Modes: numerical results and extremal limit analysis.*

PhD Thesis will be defended in 30th June 2023

Advisor: Dr. Bruno Geraldo Carneiro da Cunha

2017–2019 **Master Degree in Physics**, *Federal University of Pernambuco, Pernambuco, Brazil.*

Title *Eigenvalue for angular Teukolsky equation via accessory parameter for Painlevé V.*

Master Thesis defended in March 2019

Advisor: Dr. Bruno Geraldo Carneiro da Cunha

Resume: The purpose of this dissertation is to present an alternative way to compute the eigenvalues for spheroidal harmonics, in view of its applications to arbitrary spin quasi-normal frequencies of Kerr black hole. The alternative is based on the relation between the connection problem of the angular Teukolsky Master Equation (TME) and the dependence of the Painlevé V transcendent on monodromy data. The latter has an expansion in terms of irregular conformal blocks, uncovered by the AGT correspondence, which can in principle be used for explicit calculations. The isomonodromic deformations in the angular TME is translated to two conditions on the Painlevé V transcendent which are solved to find the expansion of the accessory parameter of the angular TME and consequently the first terms of the expansion of the eigenvalue ${}_s\lambda_{\ell m}$.

2013–2017 **Bachelor Degree in Physics**, Federal University of Pernambuco (UFPE), Recife, Brazil

Advisor: Dr. Bruno Geraldo Carneiro da Cunha

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Brazil
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https://orcid.org/0000-0003-1094-9132

Research Interests

General relativity, conformal field theory, semiclassical conformal blocks, isomonodromy deformations theory, Painlevé transcendents, Riemann-Hilbert maps, integrable systems.

Computer skills

Mathematica, Python, Linux, Julia language

Languages

Portuguese	**Mothertongue**	
English	**Intermediate**	*B2 level - IELTS*
French	**Basic**	*Basic words and phrases only*

Visiting Positions

Sep. 2018 Université de Tours, Tours (FR), two weeks

Conferences, Seminars and Schools

XLV Working Meeting on Nuclear Physics in Brazil- XLII National Meeting of Physics of Particle and Fields. Natal, Brazil, 2022. *(Meeting)*

Workshop on Classical Gravity and Applications. São Paulo, Brazil, 2022

II Perspectives in Quantum Gravity and Field Theory. 2021. *(Seminar)*

XIII Brazilian Center for Physics Research School. 2021.

XXXV North and Northeast meeting of Physics. Teukolsky Master Equation and Painlevé transcendet. 2021. *(Meeting)*

II School of Holography and Entanglement. 2020.

Holography and Supergravity. 2018. *(Meeting)*.

School/Workshop on Integrable Models: From Quantum Spin Chains and Vertex Models to AdS/CFT. 2018.

XXXI North and Northeast meeting of Physics. Rate studies in CO-OFDM optical networks with multiplexed signals via co-polarization with high transmission rates. 2013. *(Meeting)*

As Participant

João Paulo Cavalcante, Quasinormal modes for Kerr black hole via Painlevé transcendents, 2022. (Conference)

João Paulo Cavalcante, Quasinormal modes for Kerr black hole via Painlevé transcendents, 2022. (Workshop)

Cavalcante, J. P.; Carneiro da Cunha, Bruno . Teukolsky master equation and Painlevé transcendent. 2021. (Conference).

Cavalcante, J. P.; Silva, M. S. P. E. ; Freitas, J. F. L. . Rate studies in CO-OFDM optical networks with multiplexed signals via co-polarization with high transmission rates. 2013. (Conference).

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Publications

Accepted and Published Papers

See also my Github page, https://github.com/JoaoPCavalcante .

- Carneiro da Cunha, Bruno; Cavalcante, João Paulo. Expansions for semiclassical conformal blocks. ArXiv:2211.03551 (Submitted in JHEP).
- Cavalcante, João Paulo; Carneiro da Cunha, Bruno . Scalar and Dirac perturbations of the Reissner-Nordström black hole and Painlevé transcendents. Physical Review D, v. 104, p. 124040 2021.
- Carneiro da Cunha, Bruno ; Cavalcante, João Paulo . Teukolsky master equation and Painlevé transcendents: Numerics and extremal limit. Physical Review D, v. 104, p. 084051-084051-1, 2021.
- Carneiro da Cunha, Bruno ; Cavalcante, João Paulo . Confluent conformal blocks and the Teukolsky master equation. Physical Review D, v. 102, p. 105013, 2020.

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