


Helcio Felipe Junior

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Education

M.Sc. in Physics. Federal University of Rio Grande do Norte, Brazil 2019–2021


 **Thesis:** *Pearson matrices as density operators: A test of the entropic brain hypothesis using the von Neumann entropy.*

Advisor: Prof. Gandhimohan M. Viswanathan 


B.Sc. in Physics. Federal University of Santa Catarina, Brazil 2012–2018

Publications


Peer-reviewed

 A. Viol, **H. Felipe, Jr.**, F. Palhano-Fontes, H. Onias, D. B. de Araujo, and G. M. Viswanathan. “Statistical physics applied to the neuroscience of altered states: the brain under the influence of psychedelics”. *Rev. Bras. Ens. Fís.* **43** (2021). doi: 10.1590/1806-9126-RBEF-2020-0440.

Preprint


 **H. Felipe**, A. Viol, D. B. de Araujo, M. G. E. da Luz, F. Palhano-Fontes, H. Onias, E. P. Raposo, and G. M. Viswanathan. “The von Neumann entropy for the Pearson correlation matrix: A test of the entropic brain hypothesis”. [arXiv:2106.05379](https://arxiv.org/abs/2106.05379).

Book chapter


 J. R. B. Arenhart and **H. Felipe, Jr.** “The Fate of Bundle and Substratum Theories Under KS Theorem” in *A True Polymath: A Tribute to Francisco Antonio Doria*, J. A. de Barros and D. Krause, Eds. (College Publications, 2020), pp. 1–22. ISBN: 978-1-84890-351-7.

Research experience


Graduate Research Assistant 2019–2021

Statistical physics applied to neuroscience: Development of a threshold-free calculation of the entropy of correlation matrices. Complex networks and fMRI time series analyzes of the human brain. Published a paper as second author, a preprint as first author, and defended a Master’s thesis under the supervision of Prof. Gandhimohan M. Viswanathan 

Collaborator 2018–2020








Logical foundations of quantum theory: Research on quasi-set theory as a logical system for indistinguishable particles. Co-authored a book chapter with Prof. Jonas R. B. Arenhart 

Undergraduate Research Assistant 2013–2014



Electromagnetic transport properties of nanostructures: Production of porous thin films of alumina via anodization processes. Project supervised by Prof. Alexandre D. C. Viegas 

Presentations



Talks

-   **III Brazilian Meeting on Statistical Physics**  Nov. 2021
The von Neumann entropy for the Pearson correlation matrix
-  **XLVIII Paulo Leal Ferreira Congress of Physics**  Oct. 2020
Complex network approach to the neuroscience of psychedelics
-  **VI Workshop on Quantum Mechanics**  Dec. 2019
Bringing non-individuality and non-contextuality back together

Poster

-  **5th House Symposium of the Brain Institute**  Dec. 2019
Complex network approach to the neuroscience of psychedelics

Master's Oral Defense (in Portuguese) Jul. 2021

-   *Matrizes de Pearson como operadores densidade*


Fellowships and awards


- High Impact Scholarship Award (University of Exeter-UK)** Jul. 2021
Scholarship to cover Week 2 of the [Exeter School on Urban Analytics](#): Complex networks and machine learning with Python.
- Data Visualization Bootcamp** Jun. 2021
Grant for developing data visualization solutions for the non-profit [fair-fish international](#) during a one-week bootcamp.
- Graduate scholarship (CAPES-Brazil)** 2019–2021
Master's scholarship for research on statistical physics and complex systems.
- Undergraduate scholarship (CNPq-Brazil)** 2013–2014
Bachelor's scholarship for research on experimental condensed matter physics.


Teaching and outreach


- Teaching Assistant** Fall 2020
Remote teaching (COVID-19 restrictions) of mechanics to engineering majors.
- Mini-course instructor** Dec. 2019
Linear algebra and quantum mechanics to physics and philosophy majors.
- Individualized Instruction** Spring 2018
Calculus and classical physics to a visually impaired physics major.

Academic references

Prof. Gandhimohan M. Viswanathan 
Federal University of Rio Grande do Norte
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Prof. Draulio B. de Araujo 
Federal University of Rio Grande do Norte
Brain Institute
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Prof. Ernesto P. Raposo 
Federal University of Pernambuco
Department of Physics
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Prof. Jonas R. B. Arenhart 
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Department of Philosophy
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