Henrique Ennes

Curriculum Vitae

Personal information

Full name Henrique Lovisi Ennes

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Education

2023 – currently **Ph.D. candidate in Computer Science**, *Université Côte d'Azur – Institut national de recherche en sciences et technologies du numérique*, Nice, France.
Project title: *Quantum computing in topology.*
Supervisors: Clément Maria and Nicolas Nisse.

2021–2023 **Master's degree in Applied Mathematics**, *Fundação Getulio Vargas - EMAp*, Rio de Janeiro, Brazil., GPA: 4.00/4.00.
Thesis title: *Detection of representation orbits of compact Lie groups on point clouds.*
Supervisors: Raphaël Tinarrage and César Camacho.

2016–2020 **Bachelor of Arts, Mathematics and Physics (summa cumme laude)**, *Whitman College*, Walla Walla (WA), USA., GPA: 3.97/4.00.
Honors in majors.

Grants and awards

Master's **CAPES graduate student grant**
Scholarship offered by the Ministry of Education awarded to graduate students in Brazil based on merit criteria.

Undergraduate **Elected member of Phi Beta Kappa honor society**
Most prestigious academic honor society in the United States.

Laura and John Hook Family Mathematics Award
Award offered to a graduating senior in Mathematics for demonstrated talent in this field of research.

Student Commencement Marshal
Chosen among the 10 highest general GPAs of the junior class (GPA: 3.97/4.00).

M&G Wier Scholarship
Grant awarded to a junior student in recognition of talent in Mathematics.

Tristam S. Lundquist Scholarship Endowment
Grant awarded to a Physics major student in recognition of academic performance in the physical sciences.

Others **Mayor's medal of honor for advancing the study of Astronomy in Juiz de Fora**
Award offered for high performance in the Brazilian Astronomy Olympics.

Publications and preprints

2025 **Hardness of computation of quantum invariants on 3-manifolds with restricted topology**, with Clément Maria.
arXiv: `https://arxiv.org/abs/2503.02814`.

2025 **Empirical analysis of Biding Precedent efficiency in the Brazilian Supreme Court via Similar Case Retrieval**, with Raphaël Tinarrage, Lucas E. Resck, Lucas T. Gomes, Jean R. Ponciano, and Jorge Poco.
Artificial Intelligence and Law. 26 May 2025. `https://doi.org/10.1007/s10506-025-09458-6`.

2025 **LieDetect: Detection of representation orbits of compact Lie groups from point clouds**, with Raphaël Tinarrage.
To appear in *Foundations of Computational Mathematics*.

2021 **Two-body bound states through Yukawa forces and perspectives on hydrogen and deuterium**, with Moira Gresham and Alexander Shaw.
American Journal of Physics. 1 May 2021; 89 (5): 511–520. `https://doi.org/10.1119/10.0002998`.

Papers in conferences

2024 **Cost Benefit Analysis for Investments in Power Grid Resilience - A Guide**, with Edson Daniel Lopes Gonçalves, Joisa Dutra, Rafael Souza.
9th Latin American Energy Economics Meeting (ELAEE). Rio de Janeiro, Brazil.

2023 **Measuring the Power Grid Resilience: A Case Study Applied to Brazilian Distribution Companies**, with Joisa Dutra, Rafael Souza, Rafael Gomes, Lucas Amaro, Camila Albertin
27th International Conference on Electricity Distribution. Rome, Italy.

Talks and posters in conferences

June 2025 **jcgeo25: Young researchers in geometry**, Sarclay, France.
Talk title: *Hardness of computation of quantum invariants on 3-manifolds with restricted topology*.

May 2025 **Speaker at DataShape Workshop**, Porquerolles, France.
Talk title: *Hardness of computation of quantum invariants on 3-manifolds with restricted topology*.

March 2025 **Poster presenter at JNIM 2025 : Journées Nationales du GDR IFM**, Bordeaux, France.
Poster title: *Hardness of computation of quantum invariants on 3-manifolds with restricted topology*.

May 2024 **Speaker at DataShape Workshop**, Porquerolles, France

February 2024 **Participant at WinterBraids XIII**, Montpellier, France

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January 2024 **Speaker at DataShape Seminar**, Valbonne, France
Talk title *Detection of Representation Orbits of Compact Lie Groups from Point Clouds.*

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July 2023 **Poster presenter at TDA week 2023**, Kyoto, Japan
Poster title *An Algorithm for Detection of Compact Lie Group Representations in Computer Vision: Theory and Application*.

March 2023 **Debater at the Workshop "Transforming the Role of International Courts and Tribunals in a New Era of Adjudication"**, *Fundação Getúlio Vargas - ERASMUS+ Jean Monnet Centre of Excellence*, Rio de Janeiro (RJ), Brazil.
Discussion theme *Working with Large Databases on Courts*.

October 2022 **Lecturer at Seminar of School of Applied Mathematics**, *Fundação Getúlio Vargas - EMAp*, Rio de Janeiro (RJ), Brazil.
Lecture title *Detection of representation orbits of compact Lie groups on point clouds*.

March 2019 **Presenter**, *Whitman College Undergraduate Conference*, Walla Walla (WA), USA.
Talk title: *Bound states of dark matter and their cosmological consequences*.

November 2018 **Poster presenter**, *Murdock Conference*, Vancouver (WA), USA.
Poster title: *Simulation of bound states of dark matter through Yukawa potentials*.

Research experience

2021–2023 (currently) **Researcher in statistics applied to electric power distribution**, *Fudação Getúlio Vargas – Center for Regulatory and Infrastructure Studies*, Rio de Janeiro, Brazil
We study, through some economic and regulation lenses, how climate change influences the occurrence of high impact-low frequency events that affect the electric power distribution system in Brazil. Current results were obtained by statistical modeling, especially using Extreme Value Theory and Rare Event Monte Carlo Simulations, and predictions are now used in industry for investment decision-making, preventing power outages to more than 22 million customers.

2022–2023 **Researcher in empirical International Law**, *Fundação Getúlio Vargas – ERASMUS+ Jean Monnet Centre of Excellence*, Rio de Janeiro, Brazil
We quantitatively investigate the impact of World Health Organization's (WHO) norms on the Brazilian national legal system through natural language processing methods for automatic detection of both implicit and explicit references to WHO and graphical models to determine the chains of influence at the national and international levels.

2021–2023 **Researcher in empirical Constitutional Law**, *Fudação Getúlio Vargas – School of Applied Mathematics*, Rio de Janeiro, Brazil
The project quantitatively assesses the impact of biding precedents, a common law device introduced to increase the efficiency of the Brazilian judiciary system. Currently, the team has been focused on determining topological invariants of juridical decisions documents' embedding spaces, suggesting new algorithms capable of telling apart procedural and merit uses of precedents based on volunteers' annotations and applying time series techniques to measure the impact of the creation of these legal objects.

2019–2020 **Researcher in geometric quantization**, *Whitman College*, Walla Walla (WA)
We investigated the formal mathematics methods of quantization attempts and the open problem of deriving quantum theory from classical systems. Especial interest was given to geometric quantization schemes and their associated techniques. Moreover, applications to semi-classical systems and information theory were also investigated. Research conducted remotely.

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2018–2019 **Research assistant in nuclear physics and cosmology**, *Whitman College*, Walla Walla (WA)

We probed the feasibility of cluster structure of dark matter by simulating bound states using methods from nuclear physics, also developing the process techniques to solve, both numerically and analytically, eigenstate boundary value problems. Applications to baryonic matter were also considered.

Teaching experience

February 2025 April 2025 **Introduction to Data Science and Machine Learning.**, *Fundação Getúlio Vargas and Brazilian Ministry of Mines and Energy (MME).*, Rio de Janeiro, Brazil (online). (20 hours)

September 2022 December 2022 **Introduction to Mathematical Modelling Applied to Law**, *Fundação Getúlio Vargas – ERASMUS+ Jean Monnet Centre of Excellence*, Rio de Janeiro, Brazil. (16 hours)

Other relevant experiences

August 2020 December 2020 **Teaching Assistant: Physics 347 (Classical Mechanics)**, *Whitman College*, Walla Walla, WA (remote)

August 2017 May 2020 **Tutor: Physics 155 and 156 (Introductory Physics Courses)**, *Whitman College*, Walla Walla, WA

January 2018 May 2020 **Tutor: Mathematics 125, 126, and 225 (Calculus)**, *Whitman College*, Walla Walla, WA

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