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Professional Experience

2024/01 - **Assistant Professor** University of Wisconsin-Madison, **USA**
Professor of Physics and Principal Investigator in Plasma Physics.

2022-2024 **Invited Assistant Professor** Instituto Superior Técnico (IST), **Portugal**
Physics Department: teaching at undergraduate and graduate level.

2022-2023 **Junior Research Scientist** Associação do IST I&D (IST-ID), **Portugal**
Winner of the 2021 Early Research Career Program (CEEC) from FCT (Foundation for Science and Technology of Portugal) and PI on grants in Fusion Energy.

2022/01-05 **Software Developer in Machine Learning and AI** KCS IT, **Portugal**
Agile development of Python libraries (RESTful APIs) at Defined.AI with integration on Azure and Kubernetes clusters. Big Data analysis with CD/CI techniques.

2021/06-12 **Postdoctoral Researcher** Max-Planck IPP, Greifswald, **Germany**
Fellow of the Alexander von Humboldt Foundation (Humboldt-Stiftung).
- Hybrid Python/C++ coding optimizing the performance of fusion reactors.
- Deployment of massively parallel codes in supercomputing platforms.

2019-2021 **Postdoctoral Researcher** University of Maryland, College Park, **USA**
Fellow of the Simons Foundation and member of the Hidden Symmetries project.
- Derivation of a mathematical model to design stellarators (3D fusion devices).
- Numerical implementation of the model using Python, Fortran, and Matlab.

2015-2017 **Startup Co-founder & Web Developer** Company: **Portal da Sabedoria**
Educational YouTube channel (youtube.com/user/matmania1) and Tutoring website to match tutors and students
- Website development: Apache, MySQL, HTML, PHP, and Javascript.

Education

2015-2019 **Ph.D. in Physics (IST-EPFL Joint Doctoral Initiative)** Topic: Plasma Physics
Swiss Plasma Center (SPC) - EPFL, Lausanne, **Switzerland**
Instituto de Plasmas e Fusão Nuclear (IPFN), IST, **Portugal**
Title: *"A moment-based model for plasma dynamics at arbitrary collisionality"*.
Grade: Pass with Distinction and Honour. Funded by FCT.
Advisors: Prof. Paolo Ricci (EPFL), Prof. Nuno Loureiro (MIT/IST)

2010-2014 **Bachelor's and Master's in Engineering Physics** IST, **Portugal**
General Relativity, Quantum Mechanics, Programming, Electronics and Plasmas. Founder of the Engineering Physics Career Week.

Competitive Funding

2024 **NSF 23-615: Division of Physics (PHY)** NSF, USA
PI of 500k$ grant on multiscale plasma simulations using ML-based frameworks.

2023 **Unite! Seed Funding** University Network for Inn., Tech. and Eng., Europe
Co-PI grant of 10k€ on *Freshman Math Skills and Anxiety Evaluation*

2022 **EUROfusion Enabling Research Grant** EUROfusion
PI of 100k€ grant on the topic of fast-particle confinement in stellarators.

2022 **Junior Researcher Contract** Science and Tech. Foundation, FCT, Portugal
6-year contract - 4th ed. Individual Scientific Employment Stimulus program.

Computing Allocations

2024 **ACCESS Explore Project** NSF, USA
200k ACCESS Credits mostly used at Jetstream2, Indiana, Supercomputer.

2024 **OLCF Program** Oak Ridge National Laboratory, USA
15k node hours on Frontier and 2.5k node hours on Andes.

2024 **NERSC Exploratory Award ERCAP0030134** NERSC, USA
250 CPU node hours and 100 GPU node hours at NERSC.

2024 **Advanced Computing Projects, 4th ed.** FCT, Portugal
9.6k CPU core and 1.2k GPU hours at the INCD-Lisbon Cirrus supercomputer

2022 **High Performance Computing - OHARS Project** EUROfusion
47k node-hours for the 6th Marconi Fusion cycle.

Awards and Distinctions

2020 **EPS-PPD Award ("European" M. N. Rosenbluth Thesis Award")** EPS
Prize from the Plasma Physics Division of the European Physical Society granted annually for outstanding research achievements during a PhD in plasma physics.

2019 **Doctoral Program Thesis Distinction** EPFL, Switzerland
For placing in the top 8% of physics EPFL Ph.D. thesis (EDPY committee).

2018 **Publons Peer Review Award** Publons.com
For placing in the top 1% of reviewers in Physics on Publons' global database.

2017-2020 **Outstanding Reviewer** IOP Publishing
Plasma Physics and Controlled Fusion

Professional Memberships

2020-Now **Order of Chartered Engineers (Ordem dos Engenheiros)** Portugal
Effective member, License 90009, Engineer Level 2

2020-Now **Portuguese Physics Society (Sociedade Portuguesa de Física)** Portugal
Effective member n. 6200

2018-Now **American Physical Society (APS)** USA
Early Career Membership, Member 62164546

Fellowships and Studentships

2021 **Forschungsstipendium (Postdoctoral grant)** Humboldt-Stiftung, Germany
Humboldt Research Fellowship for Postdoctoral Researchers

2015-2019 **Ph.D. Fellowship - Doctoral Program APPLAuSE** FCT, Portugal
Funding from ”Fundação para a Ciência e Tecnologia” (PD/BD/105979/2014)

2014 **Erasmus Scholarship** Swiss Plasma Center, EPFL, Switzerland
Tokamak edge turbulence simulations applied to the ISTTOK tokamak. Funding from the European Union under a 6 months grant. **Advisor**: Prof. Paolo Ricci

2013 **Research Internship** Lab. Instrument. Particles (LIP), Lisbon, Portugal
Supersymmetry search at the LHC experiment at CERN. Funding from ”Fundação para a Ciência e Tecnologia” under grant CERN/FP/123601/2011. **Advisor**: Dr. Pedrame Bargassa, LIP/CERN

2012-2013 **Scientific Initiation Studentship** IST - Mathematics Department, Portugal
Point particle simulation of a fluid vortex in C++/OpenGL. University of Lisbon grant BL89/2012_IST-ID. **Advisor**: Prof. Adélia Sequeira, IST

2011 **New Talents in Maths Fellow** Calouste Gulbenkian Foundation, Portugal
One-year scholarship for students to research pure/applied mathematics. **Research Topic**: String Theory. **Advisor**: Prof. Gabriel Lopes Cardoso, IST

Teaching Experience

Professor

- Waves and Instabilities in Plasmas, Physics 724 (graduate), UW-Madison, 2024-2025
- Theoretical Phys.-Electrodynamics, Physics 721 (graduate), UW-Madison, 2024-2025
- Classical Electrodynamics, 1st-semester Physics (undergraduate), IST 2023-2024

Lecturer

- Mathematical Methods in Physics (undergraduate), IST 2022-2023
- Nuclear Fusion Reactors (master’s), IST 2022-2023

Guest Lecturer

- Intro. Plasma Physics, Physics 525 (undergraduate), UW-Madison, 2023-2024
- Classical Mechanics, Physics 410 (undergraduate), University of Maryland, 2020-2021
- Plasma Physics II (graduate), Physics 762, University of Maryland, 2019-2020

Teaching Assistantship

- Advanced Physics I (undergraduate), EPFL 2017-2018, 2018-2019
- Mathematical Analysis 1B ”Mise à Niveau” (undergraduate), EPFL 2017-2018
- General Physics I and II, Mech. Eng. (undergraduate), EPFL 2016-2017, 2016-2017
- Mechanics and Waves, Eng. Phys. (undergraduate), IST 2015-2016

Corporate Trainer

- Python Fundamentals, 50 hours, EISNT (vocational training, UFCD 10793), 2023

Academic Committee Service

2024 **PhD Admissions Committee** University of Wisconsin-Madison, USA
Selection of graduate students to pursue a PhD in Physics.

2021-2024 **Scientific Counsel Member, Alan Goodman** Universität Greifswald, Germany
Ph.D. Jury. Title: *Optimizing Quasi-Isodynamic Stellarator Configurations*.

2021 **APS-DPP Fundamental Plasma Physics subcommittee** APS, USA
Recommend Invited, Review, and Tutorial talks - 63rd APS-DPP annual meeting.

2020-2021 **University Senate** University of Maryland at College Park, USA
Senator of the Postdoc/Faculty Assistant Community

2017-2018 **Physics Ph.D. Student Representative** EPFL, Switzerland
EPFL Doctoral Program in Physics (EDPY)

2017-2018 **Working Group for Teaching Assistantship** EPFL, Switzerland
As a Ph.D. student representative, implement a European directive concerning the attribution of ECTS to teaching assistantship tasks at EPFL.

Invited Talks at International Conferences

10/2023 **65th Annual Meeting - APS-DPP, Denver Colorado, USA**
Streamlined Stellarator Design: Single-Stage Optimization with Fixed Boundary

09/2023 **Simons-CIEMAT Joint Meeting on Stellarator Turbulence, Madrid, Spain**
Stellarator design using single stage transport and turbulence optimization

06/2023 **IAEA Meeting, Fusion Data Processing, Validation and Analysis, Belgium**
The Direct Optimization Framework in Stellarator Design

03/2023 **Annual Meeting - Hidden Symmetries, Simons Foundation, NY, USA**
Direct Optimization for Enhanced Stellarator Design in MCF

09/2022 **Theory of Fusion Plasmas, Joint Varenna-Lausanne Workshop, Italy**
The direct construction of an exceptionally quasi-isodynamic stellarator

06/2022 **23rd International Stellarator-Heliotron Workshop (ISHW), Warsaw, Poland**
Novel Designs of Quasi-Isodynamic Stellarators

06/2021 **47th EPS Conference on Plasma Physics, Sitges, Spain**
A moment-based model for plasma dynamics at arbitrary collisionality

10/2019 **61st Annual Meeting - APS-DPP, Fort Lauderdale FL, USA**
An efficient treatment of the full Coulomb collision operator with applications

06/2019 **Platform Advanced Scientific Computing (PASC) Conference, Switzerland**
A Moment-Based Kinetic Model for Efficient Numerical Implementation

04/2018 **Sherwood Fusion Theory Conference, Auburn AL, USA**
A gyrokinetic model for the tokamak periphery

10/2017 **17th European Fusion Theory Meeting, Athens, Greece**
An analytical model for SOL plasma dynamics at arbitrary collisionality

Supervising Experience

Postdocs

- Cristian Vega, UW-Madison, 2024-2025: *Collaboration with Prof. Vladimir Zhdankin*
- Eduardo Neto, IST/UW-Madison, 2023-2025: *Collaboration with Proxima Fusion*

Fellowship Recipients

- Christopher Woolford, DoD, Graduate Student, 2024-: *Differentiable PIC Simulations*
- Estêvão Gomes, Gulbenkian Foundation, 2023-2024: *Coil Stellarator Optimization*

Graduate Students

- Djin Patch, UW-Madison, 2024-: *"Non-Axisymmetric Mirror Devices"*
- Dominic Seidita, UW-Madison, 2024-: *"Windowpane Coils for Stellarator Optimization"*

Master's Theses

- Miguel Madeira, IST, 2023: *"Permanent Magnet Design for Nuclear Fusion Reactors"*
- Paulo Figueiredo, IST, 2023: *"Transport of particles in nuclear fusion devices"*
- Lorenzo Perrone, EPFL, 2018: *"4-Dimensional Kinetic Scrape-off Layer Model"*
- Baptiste Frei, EPFL, 2018: *"A full-F Gyrokinetic Model for the Tokamak Periphery"*
- Sonia Gamba, Politecnico de Milano, 2017: *"Analysis of Linear Instabilities in the SOL"*

Bachelor's Theses

- Rodrigo Laia, IST, 2024, Physics Engineering, "Fusion and Machine Learning"
- Pedro Curvo, IST, 2024, Physics Engineering, "ML for Stellarator Design"
- João Rodrigues, IST, 2023, Physics Engineering, "Single Stage Optimization"
- João Cândido, IST, 2023, Physics Engineering, "Machine Learning Design"
- João Biu, IST, 2023, Physics Engineering, "Coil Winding Surfaces"
- Miguel Pereira, IST, 2023, Physics Engineering, "Dommaschk Potentials"
- Francisco Campos, IST, 2023, Electronic Engineering, "Magnetic Island Design"

Semester Internships

- Clara Cottet, Renaissance Fusion, 2022: *"Confinement of Fast Particles in Stellarators"*
- Patrick Kim, UMD, 2019: *"MHD Stability at Arbitrary Order in the Distance to the Axis"*
- Konovets Vyacheslav, EPFL, 2017: *"Modelling of Coulomb Collision Full-F Moments"*
- Antoine Baillod, EPFL 2017: *"Gyrokinetic Equations for Scrape-off Layer Plasmas"*
- Nuno Teixeira, IST, 2017: *"Influence of Pitch-Angle Scattering in EPWs"*
- Lorenzo Perrone, EPFL, 2017: *"Parallel/Perpendicular Moment Description of the SOL"*
- Clara Pereira, IST, 2016: *"Magnetic Field Generation in Accretion Disks"*

Professional Internship Advisor

- A. Almeida, D. Duarte, and R. Inácio, António Damásio School, *Python*, 2023
- L. Raquel and B. Agostinho, António Damásio School, *Web* and *GIT*, 2022

Languages

Portuguese	native speaker	**English**	fluent
French	proficient	**German**	basic

Top 5 Publications

Google Scholar (h-index 16): scholar.google.com/citations?user=sd3FAlAAAAAJ

- M. Landreman, B. Medasani, F. Wechsung, A. Giuliani, R. Jorge, C. Zhu, *SIMSOPT: A flexible framework for stellarator optimization*, **J. Open Source Softw.**, 6 (2021) - 78 citations
- R. Jorge, P. Ricci, N. Loureiro, *A Drift-Kinetic Analytical Model for SOL Plasma Dynamics at Arbitrary Collisionality*, **Journal of Plasma Physics** 83 (2017) - 37 citations
- B. Frei, R. Jorge, P. Ricci, *A gyrokinetic model for the plasma periphery of tokamak devices*, **Journal of Plasma Physics**, 86 (2020) - 35 citations
- R. Jorge, E. Oliveira, J. Rocha, *Greybody factors for rotating black holes in higher dimensions*, **Classical and Quantum Gravity** 32 (2015) - 34 citations
- R. Jorge, P. Ricci, N. Loureiro, *Constructing precisely quasi-isodynamic magnetic fields*, **Journal of Plasma Physics** 89 (2023) - 30 citations

Professional Certificates

2022 **MS Project (16 hours)** Portuguese Engineers Association, Portugal
Gantt charts, resource allocation, report tables and graphics (RN213/2022)

2022 **Certificate of Pedagogical Aptitude (CAP)** IEFP, Portugal
Certificate F724224/2022 issued on 28-01-2022 for certified training (formador).

2021 **Machine Learning - Adv. (16 hours)** Order of Chartered Engineers, Portugal
Certificate n. 866/2021 in line with the legal template n. 474/2010

2021 **Applied Machine Learning in Python** Coursera, University of Michigan
Scikit-learn, model select, Neural Nets - coursera.org/verify/4ZCWKPCYXHLB

2021 **Introduction to Data Science in Python** Coursera, University of Michigan
Numpy, Pandas, Data Cleansing - coursera.org/verify/6298Y6WK48E3

Peer Reviewer (webofscience 1655044)

- 40 reviews for Plasma Physics and Controlled Fusion
- 24 reviews for Journal of Plasma Physics
- 16 reviews for Nuclear Fusion
- 16 reviews for Physics of Plasmas
- 11 reviews for Physical Review Letters
- 6 reviews for Physical Review E
- 2 reviews for Journal of Open Source Software
- 2 review for Journal of Computational Physics
- 1 review for Cell Reports Physical Science
- 1 review for Journal of Fusion Energy

Event Organization

2022 **IPFN Stellarator Talks** IST, Portugal
Coordinated online biweekly talks by fusion energy researchers and professors.

2017, 2018 **Physics Day** EPFL, Switzerland
1-day event with talks by Nobel prize winners and leading physics professors.

2013, 2014 **Engineering Physics Career Week** IST, Portugal
3-day event with talks by industry leaders, alumni, and professors.