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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 <i>Freshman Math Skills and Anxiety Evaluation</i>	
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
French

native speaker
proficient

English
German

fluent
basic

Top 5 Publications

Google Scholar ([h-index 16](https://scholar.google.com/citations?user=sd3FAIAAAAAAJ)): scholar.google.com/citations?user=sd3FAIAAAAAAJ

- 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

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| 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

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| 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. |