María Martínez Barbeito

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Profile

Enthusiastic and motivated researcher with a strong academic foundation. Proven **proficiency in problem-solving, data analysis, and programming, demonstrating a keen aptitude for critical thinking**. Eager to apply and expand my skill set to contribute effectively in a dynamic industry environment.

Work Experience

Substitute teacher (two short-term positions) Mar 2025 – Jun 2025
Balearic public education system *Mallorca (Spain)*

- Taught Industrial Automation, Basic Electrical Installations, and Computer Equipment in vocational training programs, preparing thoroughly to teach outside my primary field.
- Taught Mathematics at the secondary school level, quickly adapting to the classroom environment and supporting a diverse range of student learning needs.

Software and Mathematical Models Developer Nov 2024 – Feb 2025
ieco.io *Remote*

- Optimized mathematical models for partial shading in self-consumption photovoltaic systems, reducing computational cost with measurable impact on accuracy.
- Implemented algorithms using Python, improving coding skills.

Predoctoral researcher Nov 2019 – Sep 2024
Institute for Cross-Disciplinary Physics and Complex Systems (IFISC) *Mallorca (Spain)*

- Gained expertise in data handling, working with and analyzing datasets in several formats.
- Presented at numerous international conferences, workshops, and schools.
- Published research in peer-reviewed journals: full list on Google Scholar.
- Engaged in science dissemination initiatives, explaining complex topics to diverse audiences.
- Collaborated with other researchers, including a 3-month stay at HES-SO Valais-Wallis (Switzerland).
- Worked on multiple research projects in parallel, including:
  - **European transmission grid stability** (2023 – 2024)
    - Analyzed the stability of the Continental European grid using linear stability theory, identifying critical lines in power transmission from distant areas.
    - Used Fortran and Matlab for simulations, and Python for analysis and visualization.
  - **VPP4Islands – European project** (2021 – 2024)
    - Implemented the digital twin in Python, worked with diverse datasets, and conducted studies related to the transition to smart and green energy, including the use of batteries.
    - Collaborated with multiple teams and contributed to the production and writing of reports.
  - **Dynamical model for power grid frequency fluctuations** (2019 – 2023)
    - Developed a digital twin of the high-voltage power grid which has proven to reproduce well the frequency statistics of real grids.
    - Conducted extensive studies on various energy transition scenarios running simulations in Fortran and analyzing the results with Python.
  - **Data analysis of frequency fluctuations** (2021)
    - Analyzed grid frequency and power data before and after the closure of a coal plant.
    - Used Python for data analysis and visualization.

Education

PhD in Physics Nov 2019 – Sep 2024

University of the Balearic Islands *Mallorca (Spain)*

- Studied power grid dynamics and stability in scenarios with a high penetration of renewable energies (see *Work Experience* for details).

MSc in Physics of Complex Systems Sep 2018 – Oct 2019

University of the Balearic Islands *Mallorca (Spain)*

- Relevant courses: Complex Networks, Stochastic Simulation Methods, Information Theory.
- Final project: Studied systemic risk and financial stability in banking systems through an agent-based model implemented in Fortran. In particular, analyzed vulnerability and resilience to external shocks.

BSc in Physics Sep 2013 – Jul 2018

University of Santiago de Compostela *Santiago de Compostela (Spain)*

- Relevant courses: Computational Physics, Experimental Techniques, Complex Systems.
- Completed a one-year academic exchange at the University of Granada.
- Final project: Reviewed several complex network models and analyzed their effect on a social behaviour model implemented in Matlab.

Skills

- Programming languages:
  - **Python** (advanced) – 20-hour course on *Analysis and visualization of data with Python*
  - **Fortran** (advanced)
  - **Matlab** (intermediate)
- Markup Languages: **HTML** (basic), **LaTeX** (advanced)
- **Microsoft Word** (advanced), **PowerPoint** (advanced), **Excel** (intermediate)
- **GIMP** (advanced)
- **Git** (basic)

Abilities

- Strong communication skills (oral and written)
- Exceptional organizational skills
- Quick learner, team-oriented, highly adaptable

Languages

- Spanish and Galician – Native
- English – Advanced
- Catalan – Intermediate (B1 certificate)

Additional Experience

Chair *(2023 – 2024)* ***& Member*** *(2022 – 2024)*

Advisory Board – Young Researchers of the Complex Systems Society (yrCSS)

- Organized the warm-up event for the annual International Conference on Complex Systems.
- Promoted collaboration among early-stage researchers and supported community-driven initiatives.