María Martínez Barbeito

+34 660872081 · martinezbarbeitomaria@gmail.com · mariamartinezbarbeito.github.io

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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

Balearic public education system
Substitute Teacher (two short-term positions)   Mar 2025 - Jun 2025

- Taught Industrial Automation, Basic Electrical Installations, and Computer Equipment in vocational training programs for Electricity and Telecommunications, 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

ieco.io
Software and Mathematical Models Developer   Nov 2024 - Feb 2025

- Developed optimized mathematical models for partial shading in photovoltaic systems, aimed at reducing computational cost with measurable impact on accuracy
- Implemented and refined algorithms using Python, improving coding skills

Institute for Cross-Disciplinary Physics and Complex Systems (IFISC)
Predoctoral Researcher – PhD in Physics   Nov 2019 - Sep 2024

- Gained expertise in data handling, working with and analyzing datasets in several formats
- Presented at numerous international conferences, workshops, and schools
- Collaborated with other research groups, including a three-month research stay at HES-SO Valais-Wallis
- Engaged in science dissemination initiatives, effectively explaining complex topics to diverse audiences
- PROJECTS:
  - **Data analysis of frequency fluctuations**
    - Analyzed the Balearic grid frequency and power data before and after the closedown of a coal plant. Found a clear change in frequency statistics attributed to coal being replaced by faster-responding generation technologies
    - Used Python for data analysis and visualization
    - Published in: Martínez-Barbeito et al. *Energy 2021 - IARIA* (2021), pp 13–18
  - **Dynamical model for power grid frequency fluctuations**
    - Developed a digital twin of the high-voltage power grid which has proven to reproduce well the frequency statistics of real grids
    - Applied it to the case of increasing wind generation in Gran Canaria and photovoltaics in the Balearic Islands
    - Conducted extensive studies on various energy transition scenarios running simulations in Fortran and analyzing the results with Python
    - Published in: Martínez-Barbeito et al. *IEEE Trans. Sustain. Energy (2023)* vol. 14, no 3, p. 1436–1445
  - **VPP4Islands – European project**
    - Implemented the digital twin in Python to model the power grid of a Turkish island
    - 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

- **European transmission grid stability**
  - Analyzed the stability of the Continental European grid using linear stability theory, focusing on the eigenmodes of the system and identifying critical lines in power transmission from distant areas
  - Used Fortran and MATLAB for simulations, and Python for analysis and visualization
  - Published in: Martínez-Barbeito et al. Phys. Rev. Res. (2025) vol. 7, no 1, p. 013137

EDUCATION

PhD in Physics – *University of the Balearic Islands*   **Nov 2019 - Sep 2024**
- 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 – *University of the Balearic Islands*   **Sep 2018 - Oct 2019**
- Relevant courses Complex Networks, Stochastic Simulation Methods, Information Theory, Modelling and Dynamics of Neural Systems
- 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 – *University of Santiago de Compostela*   **Sep 2013 - Jul 2018**
- Relevant courses: Computational Physics, Experimental Techniques, Medical Physics, Complex Systems
- Final project: Reviewed several complex network models and analyzed their effect on a social behaviour model implemented in MATLAB

COMPUTER COMPETENCIES

- 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

- Adaptability
- Quick learner
- Teamwork
- Strong communication skills (oral and written)
- Exceptional organizational skills

LANGUAGES

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

MISCELLANEOUS

- Chair (2023-2024) and Member (2022-2024) of the Advisory Board of the Young Researchers of the Complex Systems Society (yrCSS) – an international community of early-stage researchers
- Side job (2018-2019) as a private tutor teaching Mathematics and Physics up to University level