



## MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2024

### EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

#### HOST INSTITUTION

UNINOVA – Instituto de Desenvolvimento de Novas Tecnologias

#### RESEARCH GROUP AND URL

CTS – Centro de Tecnologia e Sistemas

#### SUPERVISOR (NAME AND E-MAIL)

João Murta-Pina, [jmmp@fct.unl.pt](mailto:jmmp@fct.unl.pt)

#### SHORT CV OF THE SUPERVISOR

João Murta-Pina has a long track record in applied superconductivity, and more recently in the application of Artificial Intelligence (AI), namely data-driven modeling, in this context. He coordinated the tLOSS project (PTDC/EEI-EEE/32508/2017\_LISBOA-01-0145-FEDER-032508), where he started developing that topic. João Murta-Pina is an Associate Editor of the IEEE Transactions on Applied Superconductivity journal and a senior IEEE member.

João Murta-Pina is chair of the COST Action CA19108 (<https://www.cost.eu/actions/CA19108/>) related to the use of High-temperature superconductors (HTS) for accelerating the Energy Transition, as well as a member of the board of the HTS Modelling Workgroup (<https://www.htsmodelling.com/>). These networks bring together the most prominent researchers in the field of HTS technology, particularly its modelling.

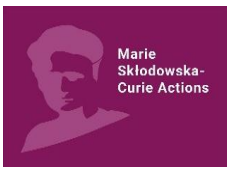
#### 5 SELECTED PUBLICATIONS

- Miúdo, L., Murta-Pina, J., Amaro, N., Pronto, A., Vilhena, N., Arsénio, P., “Case-Study of an HTS Saturable Core Reactor for Power Flow Control in a Transmission Grid”, IEEE Transactions on Applied Superconductivity, 34, 3, May 2024 (DOI: 10.1109/TASC.2024.3357050)
- Durão, D., Murta-Pina, J., Catarino, I., “Impact of Unbalanced Loads on the AC Losses of Inductive HTS Fault Current Limiters”, IEEE Transactions on Applied Superconductivity, 34, 3, 2024 (DOI: 10.1109/TASC.2024.3353699).
- Yazdani-Asrami, M., Morandi, A., Murta-Pina, J., Song, W., Parizh, M., Salmi, T., Moseley, D., Marinozzi, V., Wielgosz, M., Große, V., Bagni, T., Samoilenkov, S., Yoon, T. L., Chen, C.-C., Madureira, A., “Roadmap on Artificial intelligence and big data techniques for superconductivity”, Superconductor Science and Technology, 36, 043501, 2023 (DOI: 10.1088/1361-6668/acbb34).
- dos Santos, G., Sass, F., Hugo, V., Sotelo, G., Vilhena, N., Oliveira, R., Pronto, A., Murta-Pina, J., “Optimization Design of a Saturated Iron Core Fault Current Limiter Using a GA and PSO Algorithms Coupled With Finite Element Method”, IEEE Transactions on Applied Superconductivity, 33, 2, March 2023 (DOI: 10.1109/TASC.2022.3222260).
- Yazdani-Asrami, M., Sadeghi, A., Song, W., Madureira, A., Murta-Pina, J., Morandi, A., Parizh, M., “Artificial intelligence methods for applied superconductivity: material, design, manufacturing, testing, operation, and condition monitoring”, Superconductor Science and Technology, 2022 (DOI: 10.1088/1361-6668/ac80d8).

#### PROJECT TITLE AND SHORT DESCRIPTION

Title: Fast and Reliable Modelling of Superconducting Cables – A Key Step Towards Carbon Neutrality

This project aims to leverage machine learning paradigms to achieve unprecedented improvements in the modeling of superconducting cables. Due to their disruptive properties, such as nearly lossless operation, these cables are crucial for the energy transformation needed to meet the societal challenge of carbon neutrality. The project plans a systematic integration of data collection, finite element modeling (FEM), and machine learning to provide a novel approach to predicting the behavior of superconducting cables under diverse conditions. Key steps include aggregating a large dataset from published research and ongoing studies to ensure reliable insights into project development, developing efficient FEM models to accurately



simulate the behavior of cables and generate valuable data for model development, and engaging with experts and representatives from existing projects.

#### SCIENTIFIC AREA WHERE THE PROJECT FITS BEST\*

ENG

**\*Scientific Area where the project fits best** – Please select/indicate the scientific area according to the panel evaluation areas: Chemistry (CHE) • Social Sciences and Humanities (SOC) • Economic Sciences (ECO) • Information Science and Engineering (ENG) • Environment and Geosciences (ENV) • Life Sciences (LIF) • Mathematics (MAT) • Physics (PHY)