

GIORDANO TOMASSETTI, PhD

Senior Researcher at ENEA, Applied Supercond. Lab. | HTS Modeling & AI Specialist

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RESEARCH EXECUTIVE SUMMARY

*Senior Research Scientist with about 15 years of experience in the field of applied superconductivity, specializing in the **multiphysics modeling and optimization** of High-Temperature Superconducting (HTS) systems. Currently leading key research initiatives at **ENEA**, I have played a pivotal role in the design and analysis of large-scale superconducting magnets for international fusion projects, including **DTT** and **EUROfusion DEMO**.*

*My core expertise lies in the electromagnetic, thermal, and mechanical characterization of **Cable-in-Conduit Conductors (CICC)** and **REBCO-based** technologies. A pioneer in the intersection of **Artificial Intelligence and Superconductivity**, I have integrated neural networks, surrogate modeling, and evolutionary algorithms (e.g., Particle Swarm Optimization) into the HTS design cycle since 2015. This hybrid approach has significantly enhanced the efficiency of complex HTS architectures.*

As an active member of the international scientific community and a frequent reviewer for top-tier journals (Cryogenics, Superconductor Science and Technology), I am committed to advancing the reliability and performance of next-generation HTS superconducting devices through innovative numerical tools and multidisciplinary research.

PROFESSIONAL EXPERIENCE

ENEA - Frascati Research Centre | Senior Researcher | 2012 – Present

- **Key Projects:** Lead modeling & optimization activities for **DTT** (Divertor Tokamak Test) and **EUROfusion DEMO**.
- **Technical Leadership:** Focused on electromagnetic, thermal, and mechanical analysis of HTS Conductors.
- **Innovation:** Developed and implemented AI-based surrogate models to HTS devices and systems.
- **Collaboration:** Coordination with international partners within the EUROfusion consortium.

IMAST (Italian technological district for the engineering of polymeric and composite materials and structures) | Researcher | 2010 – 2012

- Design optimization and AI implementations for polymeric and composite structures.

CIRA (Italian Aerospace Research Centre) | *Researcher* | 2002 – 2009

- Design optimization and AI implementations for aerospace components.
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EDUCATION

Sapienza University of Rome PhD in Aerospace Engineering | 2006

- *Thesis Title:* Optimization strategies of innovative thermo-structural devices for re-entry vehicles.

Sapienza University of Rome M.Sc. in Aerospace Engineering | 2001

RESEARCH GRANTS & INTERNATIONAL PROJECTS

- **DTT Project:** Responsible for conceptual design and optimization of HTS components.
 - **EUROfusion WPMAG:** Contribution to the conceptual design and optimization of HTS components of the DEMO magnet system.
 - **NAFASSY:** Design of the large-bore 8 T superconducting magnet.
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TECHNICAL SKILLS

- **Modeling & Simulation:** Finite Element Analysis (FEA), Multiphysics coupling (EM, Thermal, Mechanical).
 - **Optimization & AI:** Neural Networks (ANN), Particle Swarm Optimization (PSO), Genetic Algorithms, Surrogate Modeling.
 - **Software:** ANSYS, COMSOL Multiphysics, MATLAB.
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PROFESSIONAL SERVICE & MEMBERSHIPS

- **Reviewer Activity:** *Cryogenics, Superconductor Science and Technology (SuST), IEEE Transactions on Applied Superconductivity, Journal of superconductivity and novel magnetism.*
 - **Advisory Board Member:** *Advanced Superconductivity.*
 - **Awards:**
 - Winner of the 2017 International CAE Conference Poster Award
 - **Awarded a Research Excellence Grant** (“Contributi premiali”) aimed at strengthening the professional status of researchers and boosting the Research System of the Lazio Region (Decree no. G05411, 05/05/2022).
 - **Formal Commendation as a Key Contributor** to the "Divertor Tokamak Test (DTT) Project Proposal Report," acknowledged by ENEA (Prot. ENEA/2015/59963/FSN, 04/11/2015).
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SELECTED PUBLICATIONS FROM THE PAST 5 YEARS

For a full list of over 30 publications, please refer to my Google Scholar profile.

1. **Tomassetti, G.**, et al., "Direct and surrogate optimization in applied superconductivity: state of the art, perspectives and challenges," *Superconductor Science and Technology*, 2025.
2. Giorgetti, F., ..., **Tomassetti, G.**, et al., "Preliminary Electromagnetic and Structural Analyses of the Conductors and Clamps of the DTT Current Feeders," *IEEE Transactions on Applied Superconductivity*, 2023.
3. **Tomassetti, G.**, et al., "A methodological approach for the optimal design of the toroidal field coils of a tokamak device using artificial intelligence," *SuST*, 2022.
4. Messina, G., ..., **Tomassetti, G.**, et al., "Transient electrical behavior of the TF superconducting coils of divertor tokamak test facility during a fast discharge," *IEEE Transactions on Applied Superconductivity*, 2022.
5. Corato, V., ..., **Tomassetti, G.**, et al., "The DEMO magnet system – Status and future challenges," *Fusion Engineering and Design*, 2022.
6. Lopes, C., ..., **Tomassetti, G.**, et al., "Design optimization for the quench protection of DTT's superconducting toroidal field magnets," *Fusion Engineering and Design*, 2022.