

MARCO ZERBINI

Research Director — Nuclear Fusion Physics & Plasma Diagnostics

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Profile

Experimental plasma physicist with 40+ years in thermonuclear fusion and plasma diagnostics. Expert in ECE, ECRH and FIR/THz spectroscopy — including THz time-domain spectroscopy (THz-TDS) for fusion — underpinned by hands-on microwave and electronics engineering, with long-standing activity at JET, DIII-D, Wendelstein 7-AS and MAST-U.

Current roles

- Research Director, ENEA Frascati (since 1989)
- Principal Investigator — EUROfusion Enabling Research ENEA-04: THz-TDS diagnostic for DTT, tested on WEST (2026–2027)
- National coordinator — Italian DEMO diagnostics (EUROfusion)
- ITPA Diagnostics Topical Group — Expert
- JET — Analysis & Modelling of the extensive experimental database

Microwave & electronics

- Design and operation of microwave, mm-wave and FIR/THz sources, detectors and heterodyne receivers.
- Analogue & digital circuit design, PCB layout (CAD) and microcontrollers (Arduino).
- Instrumentation, data acquisition and signal processing for demanding measurements.
- A lifelong hands-on discipline (3rd prize, Concorso Philips per i Giovani Ricercatori Europei, 1979), applied to current microwave/electronic Proof-of-Concept activities.

Career highlights

- Oxford (2011–present): Academic Visitor, ENEA–Oxford FIR/THz collaboration.
- DIII-D tokamak, General Atomics, San Diego (1997–present) — EUROfusion International Collaborations.
- JET (1999–2024): Responsible Officer for ECE; DCO; Real-Time ECE project.
- Frascati Tokamak Upgrade (1989–2013).
- FIREX (Italy, 2006) & NEMEX (UK, 2004–2015): technology spin-offs.

Selected publications

Co-author of 109 peer-reviewed journal articles and reviews, and 66 conference and workshop papers; 14 as first author. Full list available separately. For example:

- “Plasma diagnostic techniques based on terahertz radiation,” *Applied Physics Reviews* (2025).
- “A thorough experimental assessment of THz-TDS plasma diagnostic techniques for nuclear fusion applications,” *Review of Scientific Instruments* (2024).
- “Sailing on Far Infrared and Submillimeter Waves Plasma Diagnostics, towards THz-TDS and beyond,” invited paper, *IRMMW-THz, IEEE, Delft* (2022).