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INFN - Laboratori Nazionali di Frascati

**Superconducting Quantum Circuits:
From Amplification to Sensing and Analogue Simulations**

29/5/2025 h. 9:15, Via della Vasca Navale 109, aula N17

Streaming Teams: <https://tinyurl.com/RomaTre-JJ-2025>

Superconducting quantum circuits are microwave-frequency systems that exhibit macroscopic quantum behaviour. By incorporating Josephson junctions—nonlinear, non-dissipative superconducting elements—these circuits enable a wide range of quantum functionalities. They can serve both as parametric amplifiers and as artificial two-level systems, or qubits, forming the basis for technologies such as quantum amplifiers, quantum sensors, and quantum computers.

In this seminar, I will present the fundamental principles, key implementations, and diverse applications of superconducting quantum circuits, with a particular focus on their roles in quantum amplification, sensing, and quantum analog simulation.

Claudio Gatti is Research Director at Laboratori Nazionali di Frascati (LNF) of INFN. He coordinates the activities of COLD (<http://coldlab.lnf.infn.it>), the cryogenic laboratory for detectors at LNF where dark matter research is carried out through the use of superconducting quantum devices. In 2024, Claudio Gatti received the ERC Synergy Grant with M. Schott, D. Budker and D. Blas for the project GravNet a global network for the search for high-frequency gravitational waves.