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Correlation length of radiation-induced errors in superconducting devices

Abstract – Superconducting quantum electronics are a promising avenue towards fully fledged quantum computation. They are currently limited by their short coherence times, stemming from their sensitivity to perturbations, which include... very tiny earthquakes! I will show recent work where we measured six superconducting resonators using nanosecond-resolution electronics. High energy particles impinge on the device chip, and generate athermal phonons that propagate isotropically. Once this wavefront reaches the resonators, it induces a phase shift: by resolving the differential time of arrival in the resonators, we implement an on-chip seismic array. Equipped with this tool, we uncover a millimetric decay for this type of correlated errors. I will discuss the implications for quantum processors, and possible research avenues towards mitigation.

Bio - Francesco Valenti obtained his BSc in materials engineering from Politecnico di Torino (Italy) in 2015, his MSc in physics at Université Grenoble Alpes (France) in 2017 (where he was also admitted to and completed the "Magistère de Physique" - excellence track in physics), and his Ph.D. at Karlsruhe Institute of Technology (Germany) in 2021, where he worked in the group of Prof. Ioan Pop. His research interests include the design, fabrication and characterization of microwave devices for quantum information and radioastronomy, as well as the diagnostics and abatement of quasiparticle poisoning in superconducting quantum circuits. Since 2022 he works at IBM quantum, where he focuses on the development, debugging, deployment and calibration of large scale quantum processors based on transmon qubits. Keen on drawing and painting since childhood, he lives in New York City's East Village, spending his free time immersed in its rich art scene.

Target audience: students and early careers researchers interested in transitioning to industry.



FRANCESCO VALENTI

IBM quantum

Date:

Monday November 10, 2025

Time:

10:00am – 11:00am

Location:

ASRC Auditorium
85 Saint Nicholas Terrace
New York, NY 10031

Host:

Andrea Alù, Director, Photonics Initiative, ASRC, CUNY GC /
Enrico Maria Renzi, PhD student ASRC, CUNY GC

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