Contribution ID: **86** Type: **Parallel talk**

Measurement of a superconducting qubit in a deep underground laboratory

Tuesday 29 August 2023 16:00 (30 minutes)

In the past years there has been a growing interest in superconducting qubits. This technology, other than being one of the most promising ones for the realization of quantum computers, has also applications for particle detectors. Detectors relying on superconducting qubits are already being used to search for light dark matter candidates such as hidden photons or axions.
As the technology will improve in the next years, quasiparticles, i.e. broken Cooper pairs, are expected to become the main limit to the performances of qubits. Previous researches have already shown that ionizing radiation is a source of quasiparticles, that can result in a loss of the qubit state or, if multiple qubits are involved, correlated errors. Radioactivity has also been found to affect the stability of magnetic flux biasing of fluxonium qubits. Investigating further these effects and developing mitigation strategies is then crucial for the development of next-generation quantum devices.
In our research we studied the behavior and the performances of a fluxonium qubit in the Laboratori Nazionali del Gran Sasso (LNGS) deep-underground facility. The facility is surrounded by 1.4 km of rock, which acts as a natural shield for cosmic rays, allowing the characterization of the qubit in an unprecedented low-radioactivity environment.
In this contribution we will present the results of these measurements and the comparison with what obtained in the above ground characterization of the same qubit.

Submitted on behalf of a Collaboration?

No

Author: DE DOMINICIS, Francesco (Gran Sasso Science Institute, Italy)

Presenter: DE DOMINICIS, Francesco (Gran Sasso Science Institute, Italy)

Session Classification: Underground laboratories

Track Classification: Underground laboratories