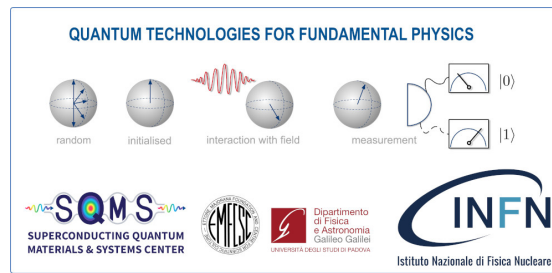


Quantum Technologies for Fundamental Physics



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History and frontiers of SRF technology and application.

SRF (Superconducting Radio Frequency) science and technology has taken the accelerator world by storm. Steady advances in SRF performance have enabled, and continue to enable, a large variety of SRF-based accelerators for applications in materials science, nuclear physics, nuclear astrophysics, and high energy physics. The total installed voltage has risen from 7 GeV in the year 2000 to 25 GeV installed and operating by 2020. In another decade the total is expected to rise to 40 GeV. There has been spectacular progress in performance, in scientific understanding of improvements, and innovative cavity designs for new applications. A large fraction of the progress is a testament to the creativity and success of imaginative researchers who have pursued efforts to gain understanding, worked on inventive treatments, and opened the door to new applications. An exciting new development is the use of SRF cavities for Quantum Computing. Nb cavities offer a transformative vehicle for increasing the coherence times of qubits from sub-milliseconds to seconds, promising to bring the quantum computing field to Quantum Advantage over classical computers. SRF is an active and exciting field with many more breakthroughs ahead!

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