



RESEARCH

INFN IN THE \$115 MILLION US QUANTUM COMPUTING PROJECT

The funding allocated by the U.S. Department of Energy (DOE) to the Superconducting Quantum Materials and Systems Center (SQMS), at the Fermi National Accelerator Laboratory (Fermilab) in Chicago, amounts to \$115 million. Headed by Anna Grassellino, researcher who took her first steps at INFN, SQMS will have the task of developing a revolutionary quantum computer based on superconducting technologies. INFN is the only non-US partner of the project and will receive a contribution from the DOE of approximately \$1.5 million. INFN is contributing to the project with a globally competitive know-how in quantum theory, superconductive and cryogenic technologies and detectors development. The use of the quantum devices implemented by SQMS will allow INFN to develop more sensitive detectors for the detection of "exotic" particles, such as dark matter. Of great importance within SQMS is the implementation of a facility for measurement, testing and validation of quantum devices at INFN Gran Sasso National Laboratories, a unique place worldwide for research with very low environmental radioactivity.

At the centre of the American race for the efficiency in quantum computing, which has a parallel in Europe with the Horizon 2020 Quantum Flagship, lies one of the most urgent problems in quantum information science today: the time of "quantum coherence", the period of time in which a qubit, the basic element of a quantum computer, can keep information unchanged. Understanding and mitigating sources of decoherence, which limit the performance of quantum devices, is critical to the engineering of next-generation computers and quantum sensors.

In addition to INFN and Fermilab, about 20 partners are participating in the SQMS project, more than 80 American research centres, universities and companies, as well as Rigetti Computing, one of the most important quantum computing industrial companies worldwide. ■