Title	*Opening Keynote: Superconducting Quantum Materials and Systems (SQMS) – a new DOE National Quantum Information Science Research Center*
Speaker	**Anna Grassellino,** National Quantum Information Science Superconducting Quantum Materials and Systems Center, Fermilab, United States

Abstract

In this talk I will describe the mission, goals and the partnership strengths of the new US National Quantum Information Research Center SQMS. SQMS brings the power of DOE laboratories, together with industry, academia and other federal entities, to achieve transformational advances in the major cross-cutting challenge of understanding and eliminating the decoherence mechanisms in superconducting 2D and 3D devices, with the final goal of enabling construction and deployment of superior quantum systems for computing and sensing. SQMS combines the strengths of an array of experts and world-class facilities towards these common goals.

Materials science experts will work in understanding and mitigating the key limiting mechanisms of coherence in the quantum regime. Coherence time is the limit on how long a qubit can retain its quantum state before that state is ruined by noise. It is critical to advancing quantum computing, sensing and communication. SQMS is leading the way in extending coherence time of superconducting quantum systems thanks to world-class materials science and through the world leading expertise in superconducting RF cavities which are integrated with industry-designed and -fabricated computer chips.

Leveraging new understanding from the materials development, quantum device and quantum computing researchers will pursue device integration and quantum controls development for 2-D and 3-D superconducting architectures. One of the ambitious goals of SQMS is to build and deploy a beyond-state-of-the-art quantum computer based on superconducting technologies. Its unique high connectivity will provide unprecedented opportunity to explore novel quantum algorithms. SQMS researchers will ultimately build quantum computer prototypes based on 2-D and 3-D architectures, enabling new quantum simulation for science applications.

Biography

Anna Grassellino is the Director of the National Quantum Information Science Superconducting Quantum Materials and Systems Center, a Fermilab Senior Scientist and the head of the Fermilab

SQMS division. Her research focuses on radio frequency superconductivity, in particular on understanding and improving SRF cavities performance to enable new applications spanning from particle accelerators to detectors to quantum information science. Grassellino is a fellow of the American Physical Society, and the recipient of numerous awards for her pioneering contributions to SRF technology, including the 2017 Presidential Early Career Award, the 2017 Frank Sacherer Prize of the European Physical Society, the 2016 IEEE PAST Award, the 2016 USPAS prize and a $2.5 million DOE Early Career Award. She holds a Ph.D. in physics from the University of Pennsylvania and a master's of electronic engineering from the University of Pisa, Italy.