

SEEQC: Scalable Energy-Efficient Quantum Computing

Quantum computers promise to revolutionize science and industry leveraging a completely different computation paradigm. Despite the significant progress made in the last years, the realization of a fault-tolerant quantum computer for real useful applications remains an enormous engineering challenge.

SEEQC is developing the first fully digital quantum computing platform for global businesses, combining classical and quantum technologies in a unique chip-scale architecture to address the efficiency, stability, and cost issues endemic to large quantum computing systems.

Digital superconducting electronics (SCE), particularly Single Flux Quantum (SFQ) based circuits, hold immense potential due to the higher speed (up to 100s of GHz) and energy efficiency (1000 less power consumption) compared to traditional semiconducting counterpart. As a leading company in the development, manufacturing and integration of classical superconducting electronics based on SFQ logic, SEEQC aims to integrate its SFQ chips with quantum processors to tackle the main engineering bottlenecks towards large scale fault-tolerant quantum computers. Leveraging the superior performances of superconducting electronics, SEEQC's quantum system provides the energy- and cost-efficiency, speed, digital control and readout required to bring the first commercially scalable, problem-specific quantum computing application to market.

SEEQC is one of the first companies to have built a superconductor multi-layer commercial chip foundry and through this experience has the infrastructure in place for design, testing and manufacturing of quantum-ready superconducting devices. SEEQC is based in Elmsford, NY with facilities in London, UK and Napoli, Italy.

In this talk we will present an overview of our company and our approach to scaling quantum computing technology, as well as details and updates on recent and relevant technological advances made specifically for on-chip digital readout.