

FM 69: Introductory Talk: Hybrid Quantum Computation Platform

Time: Thursday 9:30–10:30

Location: Audi Max

Introductory Talk FM 69.1 Thu 9:30 Audi Max
Hybrid Spin-Superconducting Circuits for Spin-Sensing and Quantum Information — BARTOLO ALBANESE, JESSICA-FERNANDA DA SILVA BARBOSA, EMANUELE ALBERTINALE, MARIANNE LE DANTEC, VISHAL RANJAN, MOONJOO LEE, MILOS RANCIC, EMANUEL FLURIN, DENIS VION, PATRICE BERTET, and •DANIEL ESTEVE — Quantronics group, SPEC, CEA,CNRS, Université Paris-Saclay, CEA Saclay 91191 Gif-sur-Yvette, France

The discovery in the mid 1980s that quantum mechanics provides resources for performing computational tasks beyond reach of machines with a classical Von Neumann architecture triggered an intense re-

search of the quantum bits needed for making a quantum computer. In the domain of electrical circuits, superconducting quantum bits based on Josephson junctions are presently the most advanced qubits. I will describe the single Cooper pair box circuit, its transmon version used nowadays, and the operation of an elementary quantum processor. I will explain the scalability challenge induced by quantum error correction, and the alternative routes for facing it. The one we develop is based on spins with superior quantum coherence coupled to quantum superconducting circuits. I will present the progress achieved in the control of a small number of electronic spins, and the perspectives open for quantum information processing.