



SUPERCONDUCTING QUBITS AND AMPLIFIERS RESILIENT TO TESLA-SCALE MAGNETIC FIELDS

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Superconducting qubits with quantum non-demolition readout and active feedback can act as information engines to probe and control microscopic degrees of freedom, both engineered and environmental. However, the magnetic field bias poses a significant challenge for the operation of conventional qubits. We demonstrate a fluxonium qubit with a granular aluminum nanojunction (gralmonium) that maintains spectral stability and coherence above 1 T [arxiv.org/abs/2501.03661]. This robust performance enables exploration of spin environment dynamics and supports hybrid quantum architectures integrating superconducting qubits with spin systems.

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Ioan was born in 1983 in Transylvania, Romania, studied physics at the Babeș-Bolyai University in Cluj-Napoca from 2002 to 2006, and graduated with a bachelor thesis on the magnetism of MnSi studied via muon spin rotation. He continued his studies in France, with a masters and a PhD in physics at the Institut NÉEL, Centre National de la Recherche Scientifique and Université Joseph Fourier in Grenoble, where he defended his doctorate in 2011. During his PhD at the Institut NEEL, Ioan was advised by Wiebke Guichard and Bernard Pannetier, in close collaboration with the group of Olivier Buisson. He worked on the measurement and modeling of quantum fluctuations in Josephson junction networks. Between 2011 and 2015 Ioan worked as a post-doctoral researcher at Yale University, USA, in the group of Michel Devoret, where he discovered the beauty and potential of microwave electronics and circuit quantum electrodynamics. In 2015 he returned to Europe to establish the Black Forest Quantum research group at the Karlsruhe Institute of Technology in Germany, where he develops superconducting hardware for quantum information processing and detectors. Since 2023 Ioan became a joint professor at KIT and Stuttgart University, following the so-called Jülicher model. He has received several honors, including a fellowship of the French Ministry of Higher Education and Research, the 2012 Thesis Prize of the French Fondation Nanosciences, and the Sofja Kovalevskaja startup award from the Humboldt Foundation.