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FWF Österreichischer Wissenschaftsfonds

Innsbruck Physics Colloquium

Mesoscopic physics challenges (in) superconducting quantum devices

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Superconducting quantum bits, or qubits, are at the forefront of quantum computing research. Harnessing the low loss properties of superconductors and the nonlinearity of Josephson junctions, qubits can be engineered to exist in quantum superposition states and they can be entangled, promising a new paradigm in information processing. By controlling and measuring these fragile quantum states, the community eventually aims to implement powerful quantum algorithms. However, due to the innate complexity of solid-state physics, superconducting qubits still have to cope with various loss and decoherence mechanisms, certainly to the chagrin of quantum computing scientists, but also to the joy of mesoscopic physicists. I will discuss three mesoscopic physics phenomena which significantly complicate the task of engineering coherent superconducting hardware: ionizing radiation interactions with the device substrate, long lived two level systems which imprint a memory in the qubit's environment, and fluctuations in the transparency of aluminum oxide tunnel barriers which are at the heart of Josephson junctions.

DK-ALM Pre-Talk: Desislava Atanasova

Time & Location: Tuesday, 29.10.2024, 16:30 h, HS C

Snacks will be provided in between the pre-talk and the colloquium.

Innsbruck Physics Colloquium, Organisation: K. Erath-Dulitz, H.-C. Nägerl, T. Schrabback

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