

Biased-noise qubits and fault-tolerant quantum computation

Prof. Mazyar Mirrahimi

National Institute for Research
in Digital Science and Technology (Inria)

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This colloquium will be held in **HYBRID format**.

On-site Venue: [Wako S01](#) Bioscience Bldg./ Suzuki Umetaro Hall

Online Venue: Zoom. To receive the link, register in advance at
https://krs2.riken.jp/m/rqc_registration_form



Qubits with strongly biased noise, in which phase-flip errors are orders of magnitude more frequent than bit-flips, arise both naturally, as in electron and nuclear spins, and by engineering, as in stabilized cat qubits. This noise structure holds the promise of reducing the daunting hardware overhead of fault-tolerant quantum computing, but exploiting it requires physical operations that do not convert frequent phase-flips into rare bit-flips. In this talk, I will discuss some prominent fault-tolerant protocols for biased-noise qubits, organized according to the available set of such bias-preserving operations. I will discuss two particular cases of superconducting cat qubits and nuclear spin qubits.