

Mesoscopic physics challenges (in) superconducting quantum devices

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I will discuss three mesoscopic physics phenomena which significantly complicate the task of engineering coherent superconducting hardware: ionizing radiation interactions with the device substrate [1,2], long lived two level systems which imprint a memory in the qubit's environment [3], and fluctuations in the transparency of aluminum oxide tunnel barriers [4].

References

- [1] Cardani & Valenti et al., Nature Comm. **12** (2021)
- [2] Gusenkova et al., APL **120** (2022)
- [3] Spiecker et al., Nature Physics *in press* (2023); arXiv 2204.00499
- [4] Willsch & Rieger et al., arXiv 2302.09192

Figures

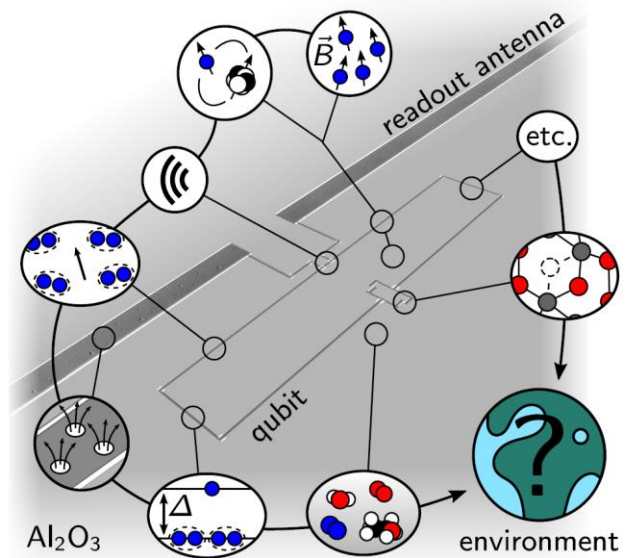


Figure 1: Superconducting qubits live in a complex environment (adapted from Ref. [3])
