Noise characterisation in Bluefors cryogenic measurement systems

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Abstract

Bluefors provides an ultra-low-noise environment for the scientific community.

In this presentation, we will introduce the activities of the Quantum Application Group at Bluefors, which focuses on identifying and characterizing noise sources, understanding their impact on quantum measurements, and exploring how this knowledge supports the scaling of quantum systems.

Specifically, we will discuss how noise can be used as a diagnostic resource using a cryogenic variable temperature noise source [1] (Fig. 1), system benchmarking measurements with qubits [2], and thermal detectors of the radiative heating introduced by qubit control lines [3].

References

[1] Slawomir Simbierowicz, Visa Vesterinen, Joshua Milem, Aleksi Lintunen, Mika Oksanen, Leif Roschier, Leif Grönberg, Juha Hassel, David Gunnarsson, Russell E. Lake; Characterizing cryogenic amplifiers with a matched temperature-variable noise source. *Rev. Sci. Instrum.* **92** (2021) 034708

[2] V. Y. Monarkha, S. Simbierowicz, M. Borrelli, R. van Gulik, N. Drobotun, D. Kuitenbrouwer, D. Bouman, D. Datta, P. Eskelinen, E. Mannila, J. Kaikkonen, V. Vesterinen, J. Govenius, R. E. Lake; Equivalence of flexible stripline and coaxial cables for superconducting qubit control and readout pulses. *Appl. Phys. Lett.* **124** (2024) 224001

[3] Slawomir Simbierowicz, Massimo Borrelli, Volodymyr Monarkha, Ville Nuutinen, and Russell E. Lake, Inherent Thermal-Noise Problem in Addressing Qubits PRX Quantum **5** (2024) 030302

Figures

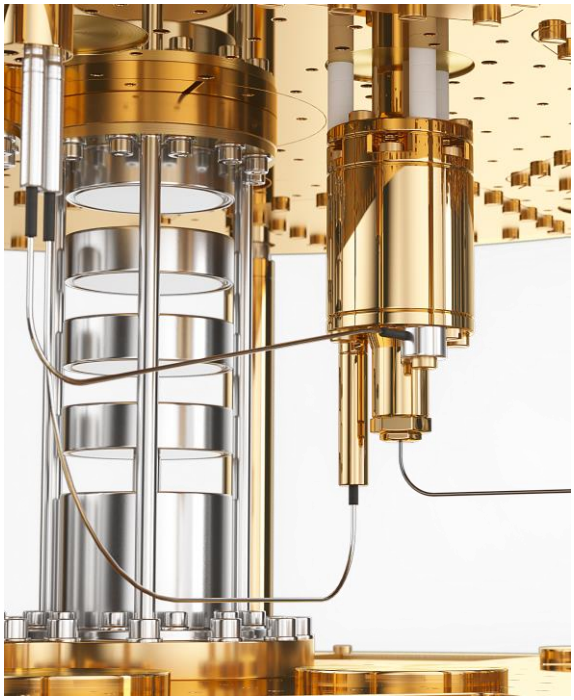

Figure 1: Bluefors variable temperature noise source.