Dispersive readout of electronuclear spin qudits with superconducting resonators

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The potential advantage of quantum computing over classical computing lies in the faster calculations that exploit the quantum nature of different systems [1]. One of these systems is magnetic molecules, which offer advantages over other platforms, such as their reproducibility, scalability, and flexibility of parameters through chemical design [2]. In particular, we study [173Yb(trensal)] molecules, which exhibit both electronic and nuclear transitions, the latter being more noise-protected. The control and readout of this system are performed using superconducting lumped element resonators (LERs). These resonators offer extremely low noise and frequency multiplexability [3], allowing a single transmission line to measure hundreds of resonators. Experiments in this novel hybrid platform already demonstrated [4] strong coupling to the nuclear transitions, and experiments using classical NMR [5] also demonstrated coherent manipulation.

In this talk, I will present our latest results in the dispersive readout of [173Yb(trensal)] spin qudits, where electronic and nuclear transitions can be detected at a single magnetic field, demonstrating the potential of this hybrid platform as a quantum processor.

References

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