

Multimode Dynamics in Bulk Acoustic Quantum Transduction

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Transduction of quantum states between superconducting and optical light would allow long-distance communication between separate quantum processors. It is therefore crucial to explore novel platforms that balance figures of merit, such as efficiency, added noise and bandwidth. We explore a transducer that uses a high overtone bulk acoustic wave resonator [HBAR] to mediate coupling between microwave and optical frequencies, as shown in Figure 1. This system lends itself well to transduction, as the HBAR is largely immune to optical heating, provides high quality factors and couples coherently to both frequency regimes. I will discuss our measurements of electromechanical and optomechanical coupling, and explore the challenges that arise from the multimode nature of our transducer.

References

- [1] Maxwell Drimmer, PhD Thesis (2025), ETH Zurich

Figures

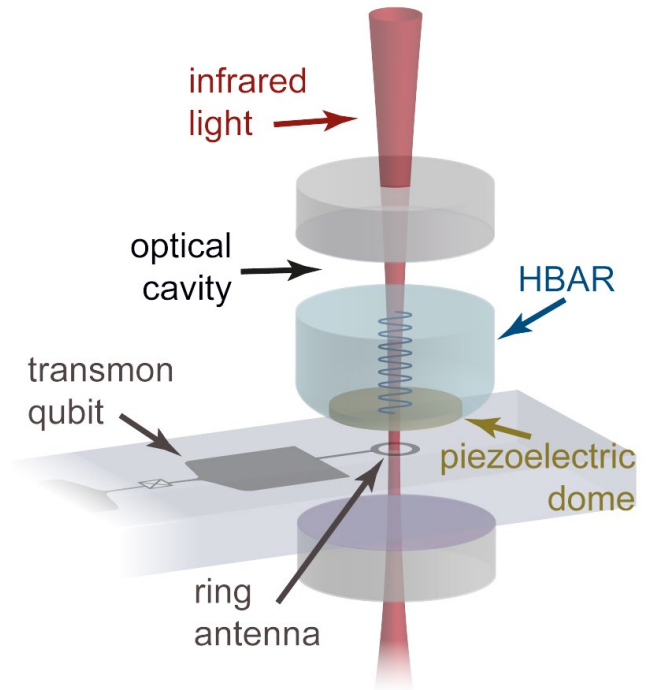


Figure 1: Schematic of the microwave-to-optical transducer using an HBAR [1].