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**Scalable Implementation of Boson Sampling with Trapped Ions**[1]
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Boson sampling solves a classically intractable problem by sampling from a probability distribution given by matrix permanents. We propose a scalable implementation of Boson sampling using local transverse phonon modes of trapped ions to encode the Bosons. The proposed scheme allows deterministic preparation and high-efficiency readout of the Bosons in the Fock states and universal mode mixing. With the state-of-the-art trapped ion technology, it is feasible to realize Boson sampling with tens of Bosons by this scheme, which would outperform the most powerful classical computers and constitute an effective disproof of the famous extended Church-Turing thesis.

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