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## **【423】 Quantum Variational Optimization of Ramsey Interferometry and Atomic Clocks**

*Wednesday, 1 September 2021 14:45 (15 minutes)*

We discuss quantum variational optimization of Ramsey interferometry with ensembles of  $N$ -entangled atoms, and its application to atomic clocks based on a Bayesian approach to phase estimation. We identify best input states and generalized measurements within in form of entangling and decoding quantum circuits. These circuits are built from basic quantum operations available for the particular platform. Optimization is defined relative to the Bayesian mean square error, ie we optimize for a finite dynamic range of the interferometer or the long-term instability of a clock. Remarkably, even low-depth quantum circuits yield excellent results that closely approach the fundamental quantum limits for optimal Ramsey interferometry and atomic clocks.

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