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Bayesian multiphase estimation at the Heisenberg limit

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Quantum (multi-)parameter estimation provides the central ingredient for many quantum technological tasks like, e.g., quantum computation or precision measurements. Previous work focussed mainly on single phase estimation at the fundamental limit, the Heisenberg limit, or on multiphase estimation at an optimal point. Here, we propose a quantum algorithm to measure d completely unknown phases and provide numerical evidence for Heisenberg limited precision of the algorithm. We show that the algorithm can outperform single phase estimation and discuss a possible quantum optical implementation.

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