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Quantum synchronization of a driven self-sustained oscillator CHRISTOPH BRUDER, ANDREAS NUNNENKAMP, STEFAN WALTER, Department of Physics, University of Basel, Klingelbergstrasse 82, CH-4056 Basel, Switzerland — Synchronization is a universal phenomenon that is important both in fundamental studies and in technical applications. Here we investigate synchronization in the simplest quantum-mechanical scenario possible, i.e., a quantum-mechanical self-sustained oscillator coupled to an external harmonic drive [1]. Using the power spectrum we analyze synchronization in terms of frequency entrainment and frequency locking in close analogy to the classical case. We show that there is a step-like crossover to a synchronized state as a function of the driving strength. In contrast to the classical case, there is a finite threshold value in driving. Quantum noise reduces the synchronized region and leads to a deviation from strict frequency locking. [1] S. Walter, A. Nunnenkamp, and C. Bruder, arXiv:1307.7044

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