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Dynamical Quantum Phase Transitions in Interacting Atomic Interferometers[1] CHANGYUAN LYU, QI ZHOU, Purdue University, West Lafayette — Particle-wave duality has allowed physicists to establish atomic interferometers as celebrated complements to their optical counterparts in a broad range of quantum devices. However, interactions naturally lead to decoherence. Here, we show that interactions lead to dynamical quantum phase transitions between Schrödinger's cat states in an atomic interferometer. These transition points result from zeros of Loschmidt echo, which approach the real axis of the complex time plane in the large particle number limit, and signify pair condensates, another type of exotic quantum states featured with prevailing two-body correlations. Our work suggests interacting atomic interferometers as a new tool for exploring dynamical quantum phase transitions and creating highly entangled states to beat the standard quantum limit.

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