

Abstract Submitted  
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**Nonequilibrium quantum dynamics of partial symmetry breaking for ultracold bosons in an optical lattice ring trap**<sup>1</sup> LINCOLN D. CARR, Colorado School of Mines, Golden, CO, USA and University of Heidelberg, Germany, MIGUEL ANGEL GARCIA-MARCH, Institute of Photonic Sciences and University of Barcelona, Spain, JAVIER VIJANDE, ALBERT FERRANDO, University of Valencia, Spain — We explore the nonequilibrium quantum dynamics of partial symmetry-breaking in ring Bose-Einstein condensates described by the Bose-Hubbard Hamiltonian with an external potential. Using exact diagonalization and group theory for small systems, we establish three new concepts to predict and characterize the dynamics after a quantum quench: symmetry memory, critical symmetry-breaking strength, and the symmetry gap. Critical symmetry breaking can manifest in current reversals, but is most clearly observed in the symmetry memory operator, based on unitary rotations.

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