

Abstract Submitted
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Investigations of quantum pendulum dynamics in a spin-1 BEC

THAI HOANG, COREY GERVING, BEN LAND, MARTIN ANQUEZ, CHRIS HAMLEY, MICHAEL CHAPMAN, Georgia Institute of Technology — We investigate the quantum spin dynamics of a spin-1 BEC initialized to an unstable critical point of the dynamical phase space. The subsequent evolution of the collective states of the system is analogous to an inverted simple pendulum in the quantum limit and yields non-classical states with quantum correlations. For short evolution times in the low depletion limit, we observe squeezed states¹ and for longer times beyond the low depletion limit we observe highly non-Gaussian distributions.²

¹C.D. Hamley, C.S. Gerving, T.M. Hoang, E.M. Bookjans, and M.S. Chapman, “Spin-Nematic Squeezed Vacuum in a Quantum Gas,” *Nature Physics* 8, 305-308 (2012).

²C.S. Gerving, T.M. Hoang, B.J. Land, M. Anquez, C.D. Hamley, and M.S. Chapman, “Non-equilibrium dynamics of an unstable quantum pendulum explored in a spin-1 Bose-Einstein condensate,” *Nature Communications* 3, 1169 (2012).

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