Abstract Submitted for the DAMOP06 Meeting of The American Physical Society

Direct Observation of Sub-Poissonian Number Statistics in a Degenerate Bose Gas. CHIH-SUNG CHUU, FLORIAN SCHRECK¹, TODD P. MEYRATH², GABRIEL N. PRICE, MARK G. RAIZEN, Center for Nonlinear Dynamics and Department of Physics, The University of Texas at Austin — We report the direct observation of Sub-Poissonian number fluctuations for a degenerate Bose gas in an optical trap [1]. Reduction of number fluctuations below the Poissonian limit is observed for average numbers that range from 300 to 12 atoms by a controlled reduction of the confining potential in one dimension. The optical trap composed of five optical sheets is integrated with single atom detection with nearly unit quantum efficiency, enabling a direct and in-situ measurement of atom statistics [2]. Future work includes the generation of arbitrary many-body number states, the study of many-body quantum tunneling, and a statistical study of quantum critical phenomena. [1] C.-S. Chuu, F. Schreck, T. P. Meyrath, J. L. Hanssen, G. N. Price, and M. G. Raizen, "Direct Observation of Sub-Poissonian Number Statistics in a Degenerate Bose Gas," Phys. Rev. Lett. 95, 260403 (2005). [2] T. P. Meyrath, F. Schreck, J. L. Hanssen, C.-S. Chuu, and M. G. Raizen, "Bose-Einstein Condensate in a Box," Phys. Rev. A 71, 041604 (2005).

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