Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Stability spectroscopy: recurring roton signatures in a dipolar-BEC phase diagram JOHN CORSON, JILA, NIST, and University of Colorado, RYAN WILSON, JQI, NIST, and University of Maryland, JOHN BOHN, JILA, NIST, and University of Colorado — When a strongly-dipolar Bose-Einstein condensate (BEC) is tightly confined in either one or two dimensions, the excitation spectrum is predicted to exhibit a nontrivial local minimum, termed "roton." Rotons have proven to be elusive in dipolar-BEC experiments, and it is therefore of interest to devise a straightforward scheme whereby rotons may be measured. We propose observing the stability of a dipolar BEC that is perturbed by a tunable optical lattice. When the stability is mapped in terms of lattice depth s and spacing λ, we find regularly-spaced features whose positions and periodicity are determined by the roton wavelength. In this sense, a measurement of the phase diagram represents a spectroscopic measurement of the roton itself. In quasi-two-dimensional geometry, the polarization tilt plays an important role in determining which features appear in the stability diagram.

John Corson
JILA, NIST, and University of Colorado

Date submitted: 29 Jan 2015 Electronic form version 1.4