

Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Study of the Lee-Huang-Yang correction for atomic bosons¹

ROBERT WILD, JILA/University of Colorado, JUAN PINO, PHILIP MAKOTYN, ERIC CORNELL, DEBORAH JIN — The famous Lee-Huang-Yang (LHY) term describes the first-order correction to the mean-field energy for strongly interacting bosons [1], yet it has only been detected with bosons composed of loosely bound fermion pairs [2,3]. Tan's universal relations, originally calculated for fermions [4], connect a property called the Contact to many macroscopic parameters of a quantum gas, such as its total energy. These relations have been verified experimentally for Fermi systems [5]. We apply these relations to a Bose gas to realize a unique tool to study the LHY correction. We perform RF spectroscopy on a BEC of ⁸⁵Rb close to a Feshbach resonance, and measure the strength of the RF lineshape tail which decays as $1/w^{3/2}$. From this we extract the Contact, which increases as a function of the interaction strength. This allows us to quantitatively study the LHY term for atomic bosons, as well as investigate time-dependent effects that arise from the rate of change of the interaction strength compared to various experimental time scales.

¹We would like to acknowledge funding from the ONR and the NSF.

Philip Makotyn
JILA/University of Colorado

Date submitted: 04 Feb 2011

Electronic form version 1.4