DAMOP14-2014-000546

Abstract for an Invited Paper
for the DAMOP14 Meeting of
the American Physical Society

Universal dynamics of a degenerate unitary Bose gas

DEBORAH JIN, JILA, NIST and University of Colorado, Boulder

Strongly interacting many-body systems at or near quantum degeneracy are a rich source of intriguing phenomena. The microscopic structure of the first-discovered quantum fluid, superfluid liquid helium, is difficult to access owing to limited experimental probes. Although an ultracold atomic Bose gas with tunable interactions (characterized by its scattering length, a) had been proposed as an alternative strongly interacting Bose system, experimental progress has been limited by its short lifetime. Here we present time-resolved measurements of the momentum distribution of a Bose-condensed gas that is suddenly jumped to unitarity, where a= ∞. Contrary to expectation, we observe that the gas lives long enough to permit the momentum to evolve to a quasi-steady-state distribution, consistent with universality, while remaining degenerate. Investigations of the time evolution of this unitary Bose gas may lead to a deeper understanding of quantum many-body physics.