Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Ultracold Atoms in a Tunable Optical Kagome Lattice[1] GYU-BOONG JO, JENNIE GUZMAN, CLAIRE K. THOMAS, PAVAN HOSUR, ASHVIN VISHWANATH, DAN M. STAMPER-KURN, University of California Berkeley — Geometrically frustrated systems with a large degeneracy of low energy state are of central interest in condensed-matter physics. The ground state for the kagome antiferromagnet with a particularly high degree of frustration has been proposed to be quantum spin liquid or valence bond solid, but experimental confirmations has been hampered by the significant magnetic disorder and anisotropy of the solid-state kagome magnet. In this talk, I will present the realization of the kagome geometry in a two-dimensional optical superlattice for ultracold ^{87}Rb atoms [1]. The kagome lattice is obtained by eliminating every fourth site from a triangular lattice of spacing a/2, with the eliminated sites forming a triangular lattice of spacing a. Our optical kagome lattice allows one to tune the lattice geometry, including kagome, one-dimensional stripe, decorated triangular lattices, thereby controlling the sensitive frustration. Our tunable lattice may offer an ideal platform not only to reveal the nature of the magnetic ground state under controlled frustration, but also to investigate possible crystalline phases in the flat band for bosons.

[1] Jo et al. Phys. Rev. Lett. 108, 045305 (2012)

[1]This work was supported by the NSF and by the Army Research Office with funding from the DARPA OLE program.

Gyu-Boong Jo
University of California Berkeley

Date submitted: 30 Jan 2012 Electronic form version 1.4