Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Roton softening and supersolidity in Rb spinor condensates ROBERT CHERNG, EUGENE DEMLER, Harvard University — Superfluids with a tendency towards periodic crystalline order have both a phonon and roton like spectrum of collective modes. The softening of the roton spectrum provides one route to a supersolid. We show that roton softening occurs in ^{87}Rb spinor condensates once dipolar interactions and spin dynamics are taken into account. By including the effects of a quasi-two-dimensional geometry and rapid Larmor precession, we show a dynamical instability develops in the collective mode spectrum at finite wavevectors. We construct phase diagrams showing a variety of instabilities as a function of the direction of the magnetic field and strength of the quadratic Zeeman shift. Our results provide a possible explanation of current experiments in the Berkeley group Phys. Rev. Lett. 100:170403 (2008).

Robert Cherng
Harvard University

Date submitted: 20 Nov 2008 Electronic form version 1.4