Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Quantum phases of quadrupolar Fermi gases in optical lattices SATYAN BHONGALE, George Mason University, LUDWIG MATHEY, University of Hamburg, ERHAI ZHAO, George Mason University, SUSANNE YELLIN, University of Connecticut, MIKHAIL LEMESHKO, ITAMP and Harvard University — We introduce a new platform for quantum simulation of many-body systems based on nonspherical atoms or molecules with zero dipole moment but possessing a significant value of electric quadrupole moment. We consider a quadrupolar Fermi gas trapped in a 2D square optical lattice, and show that the peculiar symmetry and broad tunability of the quadrupole-quadrupole interaction results in a rich phase diagram encompassing unconventional BCS and charge density wave phases, and opens up a perspective to create topological superfluid. Quadrupolar species, such as metastable alkaline-earth atoms and homonuclear molecules, are stable against chemical reactions and collapse and are readily available in experiment at high densities.

Satyan Bhongale
George Mason University

Date submitted: 28 Jan 2013 Electronic form version 1.4