Skyrmion Flux Lattices in $p$-wave Superconductors$^1$ QI LI, JOHN TONER, DIETRICH BELITZ, University of Oregon — In $p$-wave superconductors, topological excitations known as skyrmions are allowed, in addition to the usual vortices. In strongly type-II materials in an external magnetic field, a skyrmion flux lattice is expected to be energetically favored compared to a vortex flux lattice [1]. We analytically calculate the energy, magnetization curves ($B(H)$), and elasticity of skyrmion flux lattices in $p$-wave superconductors near the lower critical field $H_{c1}$, and use these results with the Lindemann criterion to predict their melting curve [2]. In striking contrast to vortex flux lattices, which always melt at an external field $H > H_{c1}$, skyrmion flux lattices never melt near $H_{c1}$. This provides a simple and unambiguous test for the presence of skyrmions. In addition, the internal magnetic field distributions (which are measurable by muon spin rotation techniques [3]) of skyrmion and vortex lattices are very different.

[2] Qi Li, John Toner, and D. Belitz, cond-mat/0607391

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