Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Two-band model of ferromagnetic p-wave superconductors CHRISTOPHER LÖRSCHER, Univ of Central Florida, JINGCHUAN ZHANG, QIANG GU, Univ of Science and Technology Beijing, RICHARD KLEMM, Univ of Central Florida — We present results on the full angular and temperature dependencies of the upper critical induction, $B_{c2}(\theta, \phi, T)$, for a ferromagnetic p-wave completely broken symmetry state (CBS), in which parallel-spin electron pairing is pinned to only one crystal axis direction, $V(\hat{k}, \hat{k}') = V_0 k_z k'_z$, normal to the spontaneuous magnetization direction. We show that the angular dependence of B_{c2} exhibits an anomalous peak at $\theta^\star < 90^\circ$, due to a competition between order parameter anisotropy and effective mass anisotropy. We also propose a two-band model for ferromagnetic superconductors, where we have two ellipsoidal Fermi surfaces (FSs). Using this model, and by assuming a field-dependent anisotropic effective mass on one of the FSs, $m_{\uparrow,i}(B)$, we can fit the experimental data for the low-temperature specific heat $\gamma(B)$ of URhGe, which exhibits a peak at $\mu_0 H \sim 12$T in the b-axis direction. We provide quantitative fits to experiment, and propose that this model of a field-dependent effective mass can help to understand the reentrant phase of the ferromagnetic superconductor URhGe, and the upward curvature observed in B_{c2} of UCoGe

Richard Klemm
Univ of Central Florida

Date submitted: 14 Nov 2013 Electronic form version 1.4