Abstract Submitted
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Doped Mott insulator physics in the 4f antiferromagnet CeIn3 and implications for pressure-tuned superconductivity[1] NEIL HARRISON, Los Alamos National Labs, SUCHITRA SEBASTIAN, Cavendish Lab, CRISTIAN BATISTA, MARCELO JAIME, STUART TRUGMANN, VICTOR FANELLI, Los Alamos National Labs, TAKAO EBIHARA, Shizuoka Univ., ERIC PALM, TIM MURPHY, Florida State Univ., HISATOMO HARIMA, Kobe Univ. — We report recent de Haas-van Alphen experiments performed at low temperatures ($T > 30$ mK) and high magnetic fields in $CeIn_3$ that motivate us to revise our understanding of strongly coupled antiferromagnetism in f-electron systems. In addition to the known light Fermi surface sheets, heavy ellipsoid pockets are observed with a symmetry consistent with them being situated at the $\pi/2, \pi/2, \pi/2$ point in the paramagnetic Brillouin zone. Their topology is the 3D analog of the 2D hole pockets reported to exist at $\pi/2, \pi/2$ in underdoped cuprate superconductors, indicating some degree of similarity between the the electronic structures in the d- and f-electron systems. The effective masses of the ellipsoids are sufficient to account for all of the electronic specific heat of CeIn $_3$ at ambient pressure within the antiferromagnetic phase, making them strong candidates for the origin of the coexisting superconductivity under pressure. High magnetic fields cause these pockets to undergo a topological deformation, passing through a Lifshitz transition at ~ 40 T.

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