

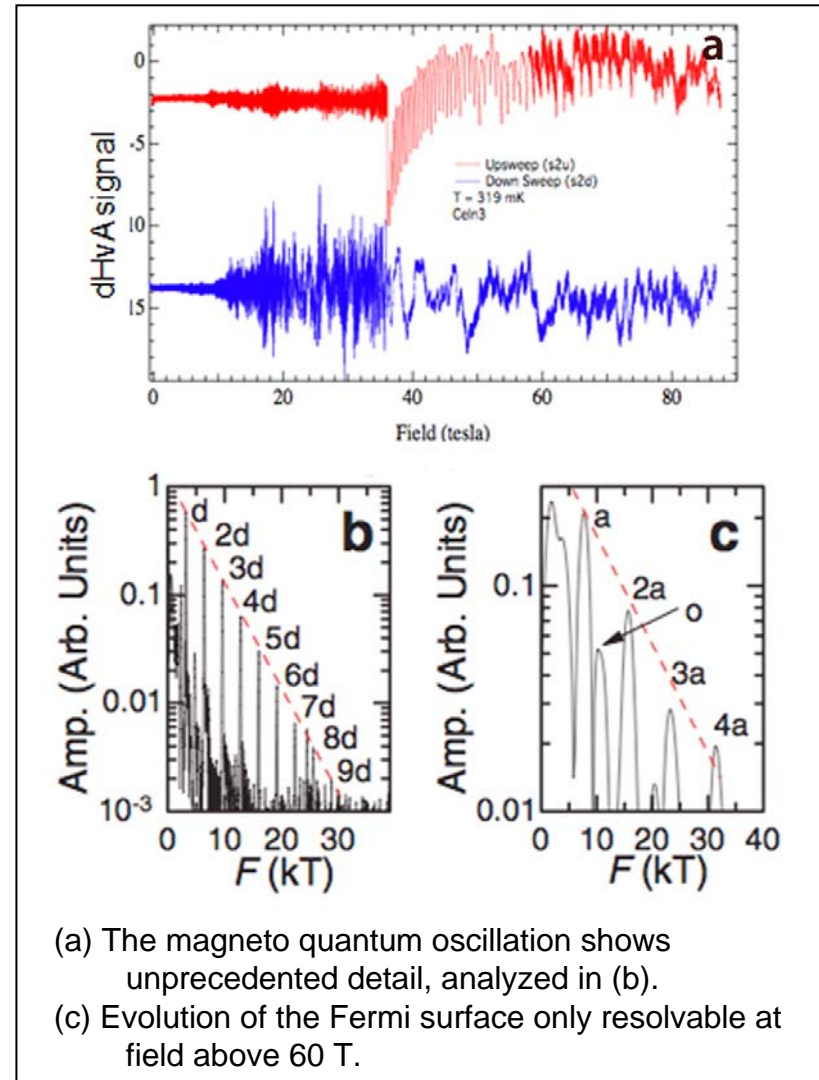
Fermi Surface of CeIn_3 above the Neel Critical Field

National High Magnetic Field Laboratory

Pulsed Field Facility User Program, Los Alamos National Laboratory

The electronic structure of materials is responsible for the manner in which the material responds to electrical stimulation. Whether or not it is an insulator or a conductor is tied to the electronic ground state. Magnetic fields confine the electronic orbitals of the electrons in metals in a well-defined way that reveals their “electronic identity” or Fermi Surface. In CeIn_3 the magnetic field induced destruction of the magnetic ground state causes a change of the Fermi Surface.

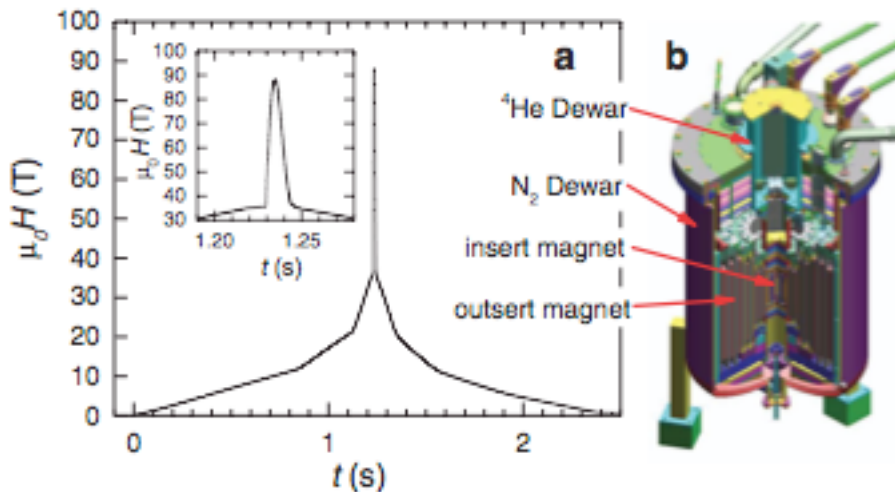
Harrison, N.; Sebastian, S.E.; Mielke, C.H.; Paris, A.; Gordon, M.J.; Swenson, C.A.; Rickel, D.G.; Pacheco, M.S.; Ruminer, P.F.; Schillig, J.B.; Sims, J.R.; Lacerda, A.H.; Suzuki, M.-T.; Harima, H. and Ebihara, T., *Phys. Rev. Lett.*, **99**, 056401-1-4 (2007)



Fermi Surface of CeIn_3 above the Neel Critical Field

National High Magnetic Field Laboratory

Pulsed Field Facility User Program, Los Alamos National Laboratory



(a) The H -vs-time T profile of the pulse generated by the combined “outsert” and “insert” magnets. The inset shows the region of the pulse profile provided by the insert magnet in which dHvA measurements were made. (b) A schematic of the magnet used for generating the pulse (outer diameter ~ 1.4 m).

Knowing how the magnetic ground state is destroyed and determining the connection to superconductivity CeIn_3 may reveal the underpinnings of unconventional superconductivity. In certain cases such as this material there is simply no substitution for higher magnetic fields.

The 100 T-MS magnet system was used for this investigation (to fields of 85 tesla). This unique resource is a key element to the highly specialized magnet systems at the NHMFL that are leading the world.

Harrison, N.; Sebastian, S.E.; Mielke, C.H.; Paris, A.; Gordon, M.J.; Swenson, C.A.; Rickel, D.G.; Pacheco, M.S.; Ruminer, P.F.; Schillig, J.B.; Sims, J.R.; Lacerda, A.H.; Suzuki, M.-T.; Harima, H. and Ebihara, T., *Phys. Rev. Lett.*, **99**, 056401-1-4 (2007)