Quantum Oscillations and Fermilology of $Ce_2Rh_3Ge_5$

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Introduction

$Ce_2Rh_3Ge_5$ is a member of the family of correlated *f*-electron systems, which are especially interesting for their variety of ground states as well as their possible relation to the more strongly interacting electrons of the cuprates. Previous work by Baumbach *et al* show evidence of an antiferromagnetic quantum phase transition near 22 T as well as a hint of quantum oscillations near 35 T. Work at the LANL pulsed field facility has extended the field range of these measurements revealing a multiple quantum oscillation frequencies corresponding to a range of Fermi surface cross sections.

Experimental

$Ce_2Rh_3Ge_5$ samples were mounted for PDO measurements. Conductivity was measured in LANL 65 T pulse magnets. PDO, proximity detection oscillator, uses an oscillating tank circuit to detect changes in conductivity. Quantum oscillations in conductivity can provide information about the Fermi surface of the material.

Results and Discussion

The PDO measurements yielded multiple quantum oscillation frequencies. These oscillations are being compared to calculated Fermi surfaces. The temperature dependence of the quantum oscillation amplitude reveals moderately heavy (~10m_e) cyclotron masses. Measurements were also conducted as a function of angle, producing oscillations with a variety of frequencies as is expected from Fermi surface calculations.

Conclusions

Quantum oscillations reveal multiple Fermi surface cross sections. Comparison of the observed frequencies to band structure calculations are paramount for understanding the degree of *f*-electron hybridization at the Fermi energy and the correlated electron physics in this material.

Acknowledgements

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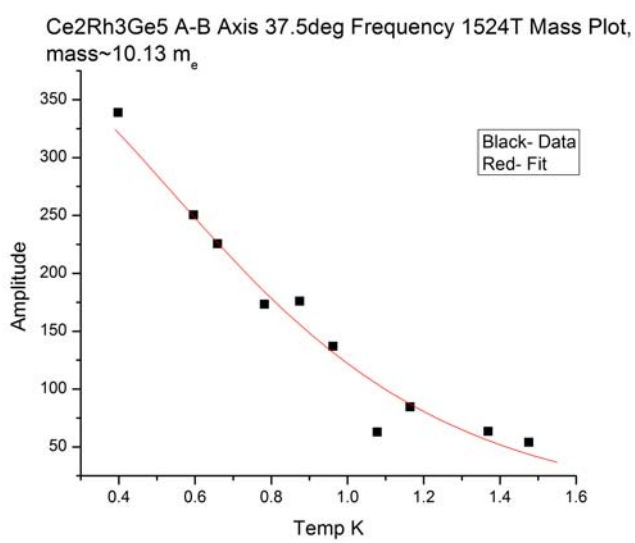

Fig.1 Mass plot based on temperature dependent quantum oscillations.

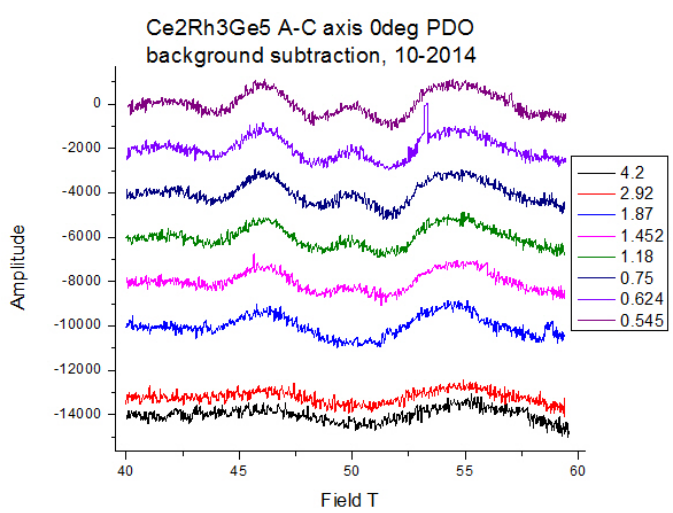

Fig. 2 PDO amplitude against magnetic field. This figure shows the increase in quantum oscillation signal with decreasing temperature.