STARK OSCILLATIONS IN $(Per)_2Au(mnt)_2$ UNDER PRESSURE

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Introduction

At ambient pressure the quasi-one-dimensional (Q1D) molecular conductor, $(Per)_2Au(mnt)_2$, goes though a Peierls distortion at 12 K. The resulting charge density wave (CDW) is observed as a large increase in resistance below the transition temperature. It has recently been shown that pressure can be used to suppress the CDW (see phase diagram, Fig. 1) and oscillations in high field magnetoresistance are observed at pressures above 3 kbar.

Experimental Results

The magnetoresistance of $(Per)_2Au(mnt)_2$ (B//*c*-axis ~ the applied field is perpendicular to the conducting plane) in a double-clamped BeCu pressure cell was measured using standard lock-in techniques with applied magnetic fields provided by the NHMFL hybrid magnet. The pressure of the samples was calibrated using the pressure dependence of Manganin wire.

The temperature dependence of the magnetoresistance under 5.0 kbar of pressure is shown in Fig. 2a. Oscillations in the magnetoresistance are Shubnikov de Haas-like (SdH) in appearance with a frequency of approximately 18 tesla. Six distinct peaks can be found in the data taken at T = 0.5 K (Fig. 2b). The peak observed near 15 tesla can be observed in temperatures as high as 10 K.

Discussion and Conclusions

Band structure calculations [1] have shown that Fermi surface (FS) sheets may lie in close proximity so that pressures as low as 3 kbar allow quantum interference (QI) between the nearest points of neighboring sheets. The temperature dependence of the oscillation peaks does not follow ~ T/sinh(T) behavior (expected for 2D systems), which confirms the origin as QI rather than closed FS orbits.

Acknowledgements

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References

[1] Canadell, E., *et al*., Eur. Phys. J. B, **42**, 453 (2004).

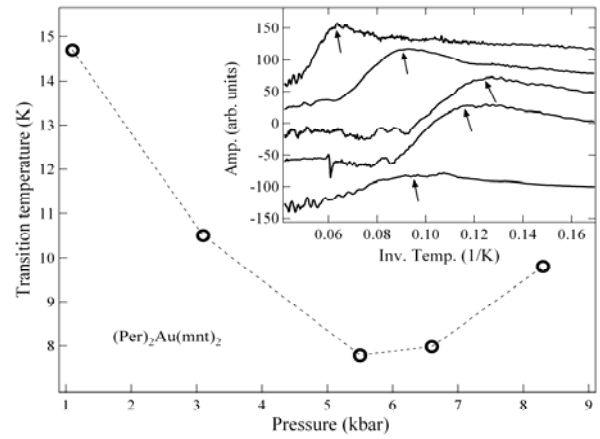

Figure 1. Transition temperature vs. pressure phase diagram for $(Per)_2Au(mnt)_2$. Inset: Transition temps. are determined by peaks in dLn(Res)/d(1/T) (black arrows).

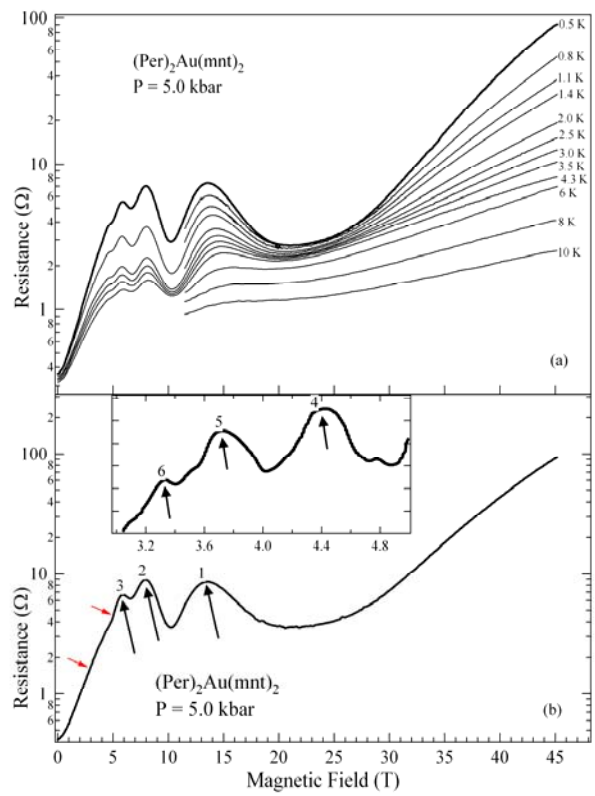

Figure 2. (a) Temperature dependence of the magnetoresistance of $(Per)_2Au(mnt)_2$. (b) Magnetoresistance trace at T = 0.5 K. Black arrows and numbers indicate the index of the Landau level associated with each peak. The red arrows show the field from which the inset was taken.