Magnetically Ordered Solid ^{3}He near the Triple Point

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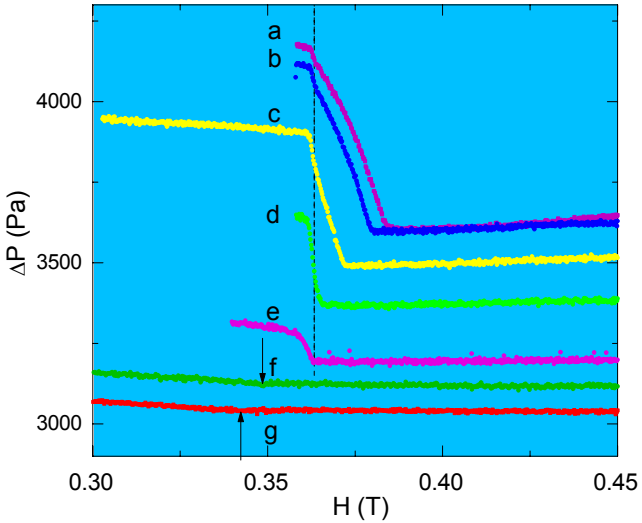
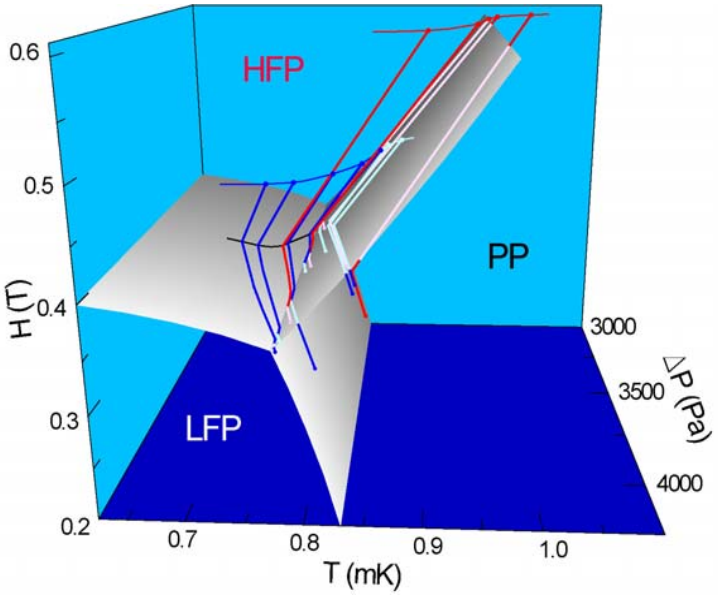
Solid ^{3}He is ideal for studying fundamentals of magnetism, an area of increasing technological importance. Ordinarily, magnetic transitions are second-order. In solid ^{3}He, transitions from the disordered paramagnetic phase (PP) to the low-field phase (LFP) and from the LFP to the high-field phase (HFP) are first-order. The PP-HFP transition is unusual—first order at the triple point, then changing to second-order as the field increases. We have studied this in two-stage adiabatic demagnetizations of the ^{3}He itself (top fig.). We provide the first unambiguous proof that the transition is first-order at the triple point (bottom fig.).



Pressure during adiabatic demagnetizations.



Phase transitions near the triple point.

J. Low Temp. Phys. In press.