SQUID-NMR studies of ^{3}He Films on Graphite in the Microkelvin Temperature Range

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We report preliminary measurements of the spin-dynamics of ^{3}He films adsorbed on graphite at temperatures in the range 200 μK to 300 mK. These films provide a model system for the study of both strongly correlated two-dimensional Fermi-systems and the frustrated magnetism of a two-dimensional $S = 1/2$ solid on a triangular lattice. Pulsed SQUID-NMR techniques have been used to investigate the nuclear spin susceptibility, frequency shift and spin-spin relaxation time.
A two layer ^{3}He film consisting of a paramagnetic first layer and strongly correlated Fermi fluid second layer, is observed to exhibit two component free induction decays. Analysis in terms of a model for coupled spin-relaxation provides evidence for slow interchange between the two subsystems. On increasing the coverage the second layer is believed to form a 4/7 or 7/12 triangular superlattice, with a gapless quantum spin-liquid state. Our experiment allows the study of the spin dynamics of this $S = 1/2$ quantum spin-liquid on a triangular lattice, and by finely tuning the helium-3 coverage, the influence of hole-doping.

Section: LD - Low dimensional and confined systems

Keywords: 2D helium film, spin-liquid, superlattice, SQUID-NMR