Pressure study of $Co_{1/3}NbS_2$

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Systems in which magnetic ordering is suppressed to low temperatures due to competing interactions have attracted much attention in recent years. In $Co_{1/3}NbS_2$, the cobalt atoms are intercalated within the layered structure of the parent compound 2H-NbS_2, forming the triangular lattice between NbS_2 layers. At ambient pressure, spins on the Co atoms show antiferromagnetic ordering at 26 K, with ferromagnetic chains formed along one plane direction. Hydrostatic pressure suppresses the ordering at a rate of dT_N/dp = 1.2 K/kbar.[1] Recent investigations indicate the occurrence of a quantum critical point at p = 2.6 GPa, as well as non-monotonous pressure dependence of the Kondo-type behavior. The ordering mechanism is not fully understood yet, although the competition of super-exchange and RKKY interactions are natural candidates. Notably, ordering takes place within the metallic host, and the possibility exists that the suppression of the ordering proceeds via the Doniach mechanism in which the magnetic moment is screened by the conducting electrons. In this contribution we present an extensive set of measurements characterizing the transport properties of $Co_{1/3}NbS_2$ under pressure. We also touch upon the high-pressure facilities that are currently being developed in our laboratory. Future direction of investigation will be highlighted, as well as other ways to affect magnetic subsystems. The possible role of NMR in helping to resolve the mysteries of this, and related systems, will also be discussed.

[1] N. Barišić, *et al.*, Phys. Rev. B, accepted