MULTFREQUENCY ESR STUDIES OF LOW-DIMENSIONAL ANTIFERROMAGNETS IN HIGH MAGNETIC FIELDS.

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Multi-frequency (MF) electron spin resonance (ESR) is one of the most powerful techniques to investigate spin or orbital dynamics and magnetic excitations of magnetic materials. In the presentation, I am going to talk about two topics to demonstrate the usefulness of ESR as a probe of material research.

The spin and orbital dynamics of a perovskite spin-orbital liquid candidate $Ba_3CuSb_2O_9$, the crystal of which with almost perfect stoichiometry shows no orbital ordering down to the lowest temperature of 1.5 K. Dramatic change in the *g*-factor anisotropy as a function of frequency and temperature demonstrates orbital quantum fluctuations, evidencing the emergence of an orbital liquid state in $Ba_3CuSb_2O_9$. [1]

MF ESR and magnetization measurements in high magnetic fields (*H*) along the chain direction (*c*-axis) were conducted on $BaCo_2V_2O_8$ which is regarded as a quasi-one-dimensional spin-1/2 XXZ antiferromagnet. We have found that the quantum phase transition (QPT) from the Neel ordered phase to the spin liquid one is driven by softening of the spinon excitation. [2] A similar QPT has been observed for *H*//[100], but not for *H*//[110], which is caused by a peculiar structure of $BaCo_2V_2O_8$, resulting in the emergence of staggered fields perpendicular to the chain direction only for *H*//[100]. [3]

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