



ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUMThursday, 13 May 2010
17:00-18:003rd Floor Seminar Room***“High-Field ESR in Low-Dimensional Spin Systems”***Sergei Zvyagin
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Abstract

Quantum fluctuations in low-dimensional magnets give rise to a variety of exotic strongly correlated states, making those systems an extremely attractive ground for testing various theoretical concepts. In this presentation I will focus on high-field ESR studies of two spin-chain systems. The first system is copper pyrimidine dinitrate, a material containing $S=1/2$ antiferromagnetic chains with alternating g -tensor and the Dzyaloshinskii-Moriya interaction and exhibiting a field-induced spin gap. Signatures of three breather branches and a soliton excitation have been identified [1,2], which is in excellent agreement with predictions of the sine-Gordon quantum field theory. In addition, a field-induced crossover from the soliton-breather to the magnon state was observed in this material in higher magnetic field [3]. The second material is $\text{NiCl}_2 \cdot 4\text{SC}(\text{NH}_2)_2$ (DTN), a quantum spin-1 chain system with strong easy-plane anisotropy. Using high-field ESR data, a revised set of spin-Hamiltonian parameters has been obtained [4]. These values were used to calculate the antiferromagnetic phase boundary, magnetization and the frequency-field dependence of two-magnon bound-state excitations predicted by theory and observed in DTN for the first time. Excellent quantitative agreement with experimental data was obtained.

1. S.A. Zvyagin et al., Phys. Rev. Lett. 93, 027201, 2004.
2. S.A. Zvyagin et al., Phys. Rev. Lett. 95, 017207, 2005.
3. S.A. Zvyagin et al., unpublished.
4. S.A. Zvyagin et al., Phys. Rev. Lett. 98, 047205, 2007.