Coherent electron spin interaction in spin-Peierls system (o-DMTTF)$_2$Br

Blank line (12 points)

S. Bertaina,[1] L. Soriano[1], M.D. Kuzmin[1], H. Vezin[2], O. Jeannin[3], M. Orio[4], M. Fourmigué[3]

Blank line (12 points)

[1] CNRS, Aix-Marseille Université, IM2NP, 13397 Marseille, France e-mail: sylvain.bertaina@cnrs.fr
[2] CNRS, Université de Lille, LASIRE, 59655 Villeneuve d'Ascq, France
[3] CNRS, Université de Rennes, ISCR, 35042 Rennes, France
[4]CNRS, Aix-Marseille Université, Centrale Marseille, ISM2 13397 Marseille, France

Blank line (12 points)

(o-DMTTF)2Br is a very good prototype of quasi-isotropic Heinsenberg spin chain at room temperature with a strong intrachain coupling J~600K [1]. At T< 50K, the system undergoes to a spin-Peierls transition opening a gap in the continuum of energy leading to a non-magnetic ground state. A break in the translational symmetry polarizes many spins of the chains in the neighborhood of the defects forming a soliton : a S=1/2 quasi particle built of many correlated spins.

By means of electron spin resonance, I will show that the pined solitons have quantum coherence properties and that the relaxation process are rules by the full spin chain [2]. I will show that the 1D nature of the chain allows the existence of pairs of solitons with a probability of 50% independent to the defect concentration [3].

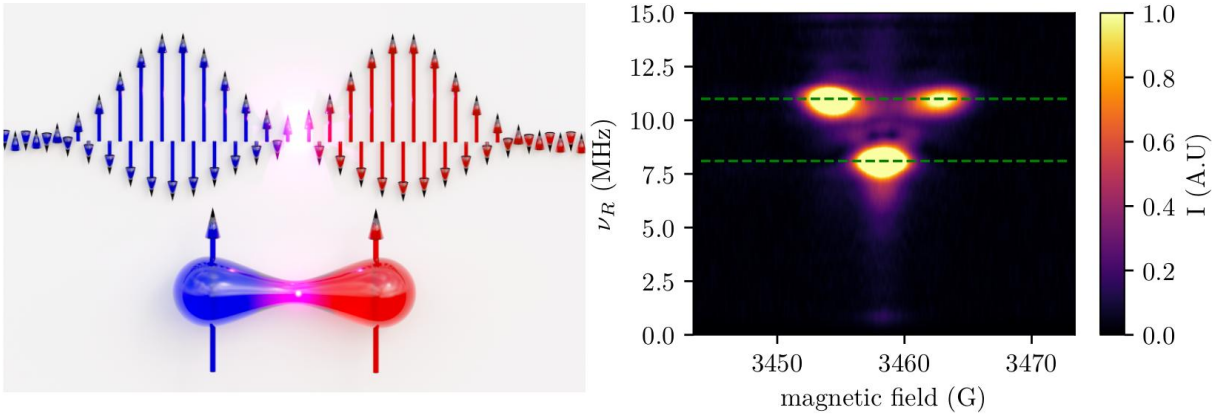

Fig. 1. left) Schematic representation of a pair of magnetic solitons pined to the defect (middle). Right) Field sweep Rabi oscillations of a single (7.6MHz) and pair of solitons (11MHz).

References

[1] P. Foury-Leylekian *et al.*, *Phys. Rev. B* **84** , 195134 (2011).
[2] J. Zeisner *et al.*, *Phys. Rev. B* **100**, 224414 (2019).
[3] L. Soriano *et al.*, Phys. Rev. B **105**, 064434 (2022)