



Invitation

LMU-Seminar

Title: Breaking chains and squeezing ladders: Experimental study of clean and dirty quantum magnets
Speaker: Mr. Gediminas Simutis, NSM laboratory, ETH Zurich
Time: Friday, June 17th 2016, 10:00
Place: WBGB/019

Abstract:

When quantum magnets are perturbed, they often exhibit qualitatively new ground states as well as modified excitation spectra. In this talk I will present three experimental examples of ways to perturb the quantum magnets and how the arising phenomena can be observed. A combination of muon spin rotation techniques, neutron scattering and light spectroscopy enables accessing the various facets of induced phenomena.

I will start by describing the experiments on fragmented Heisenberg Antiferromagnetic $S=1/2$ chains SrCuO_2 and Sr_2CuO_3 . We have found that as such chains are broken, the ordered state becomes inhomogeneous and the ordering temperature decreases [1]. The excitations undergo dramatic changes too - a pseudogap develops in the spectrum [2].

In the second example, I will present a spectroscopy study of a tunable spin ladder. An organometallic compound $\text{Cu}(\text{C}_8\text{H}_6\text{N}_2)(\text{Cl}_{1-x}\text{Br}_x)_2$ is a special realization of a spin ladder where we could use chemical substitution as well as hydrostatic pressure as a handle to vary the exchange parameters of the leg and the rung and observe the changes in the excitations [3].

Finally, I will revisit a recent discovery of quantum critical and multicritical points in a frustrated spin liquid $(\text{C}_4\text{H}_{12}\text{N}_2)\text{Cu}_2\text{Cl}_6$ [4] and show how light spectroscopy measurements at multiple pressures enabled the confirmation of the second phase transition.

[1] Simutis et al., arXiv:1603.04090 (2016)

[2] Simutis et al., Phys. Rev. Lett. 111, 067204 (2013)

[3] Simutis et al., Phys. Rev. B. 93, 094412 (2016)

[4] Thede et al., Phys Rev. Lett. 112, 087204 (2014)