



# Invitation LMX Seminar

## **Tuning two dimensional Cu-based quantum spin systems**

**Pascal Puphal**

Goethe University, Frankfurt a.M., Germany

**Wednesday, November 29, 2017, 10.00 h**  
**WSLA/105**

### **Abstract:**

The search for novel topological ground states in low dimensional systems is presently of highest interest and thus was recently acknowledged by the Nobel price in 2016 to Kosterlitz (K) and Thouless (T) for their theory on topological excitations in KT transitions. A material realizing this state is BaCuSi<sub>2</sub>O<sub>6</sub>, where the two dimensional dimer lattice leads to a condensate of bosonic quasi particles called triplons in magnetic fields, but when a structural phase transition at 100 K to a more complex phase was discovered the community lost interest in this material. However the talk presents a substitution series that stabilizes the room temperature phase, while keeping the condensation of triplons intact.

Another related topic is the search for new materials revealing a magnetic ground state presenting a quantum spin liquid (QSL). A class of material where this state is theoretically proposed and where also the first example has been found are those presenting a two dimensional kagome lattice as in Herbertsmithite, ZnCu<sub>3</sub>(OH)<sub>6</sub>Cl<sub>2</sub>. Here the arrangement of the magnetic copper ions prevents a satisfaction of the antiferromagnetic arrangement of spins. The talk addresses the possibility of doping such a kagome lattice with electrons, presenting the synthesis and properties of new materials in this class.

Puphal et al., Phys. Rev. B 93, 174121 (2016)

P. Puphal, et al., J. Mater. Chem. C 5, 2629 - 2635 (2017)