## Summary
Quantum spin systems are insulating crystals containing regular array of atoms carrying spin \( S = 1/2 \) or 1, which can be described by simple spin Hamiltonians. In low-dimensional model compounds we study by Nuclear Magnetic Resonance (NMR), which is a microscopic probe to magnetism, the magnetic-field-induced "exotic" phases, such as the Bose-Einstein condensate (BEC).

## Detailed subject
Based on the microscopic information obtained from nuclear magnetic resonance (NMR) measurements, coupled to advanced theoretical numerical analysis, we aim at understanding of topical, magnetic-field-induced phenomena in antiferromagnetic quantum spin systems of the Bose-Einstein condensation (BEC) type.

Having so-far covered in great detail quasi-one dimensional materials such as spin ladders [1,2] and chains [3], we will now focus on two-dimensional model systems. We will investigate the \( \text{Ba}_2\text{CuSi}_2\text{O}_6\text{Cl}_2 \) spin-dimer compound, a new archetypal 2D system that has its BEC phase completely accessible to high-field NMR experiments, in the 13-28 T range.

The internship provides an introduction to the NMR technique and its application to study one BEC-type system. It involves all aspects of the work: preparation of experiments, NMR measurements, cryogenics, analysis of the results, numerical simulations, and will be performed in an internationally recognized research group. The investigation of the \( \text{Ba}_2\text{CuSi}_2\text{O}_6\text{Cl}_2 \) compound can also be recommended as an excellent subject for an experimental thesis, strongly coupled with theory.

## Publications linked to the theme

## Background and skills expected:
The candidate should be motivated for topical research in a high-level international laboratory and is expected to have a solid knowledge of solid state physics and quantum mechanics. Experimental skills and some knowledge of electronics and/or NMR technique will be an advantage.

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