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## Vortragsankündigung

Donnerstag, den 10. Januar 2019, 17.15 h  
Hörsaal III, Physik-Department, Garching

### An introduction to quantum spin nematics

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#### Abstract:

Liquid crystals, in which molecules align to break rotational symmetries of space - without at the same time breaking translational symmetries - are ubiquitous in nature, and form the basis for many modern display technologies. The idea that a quantum magnet might also act like a liquid crystal, breaking spin-rotation symmetry without breaking time-reversal symmetry, holds an abiding fascination. However, until recently, such "spin-nematics" were generally seen as objects of mathematical curiosity, with little connection to reality. Happily, the last decade has seen great progress in the understanding of spin-nematics, and there is now good reason to believe that spin-nematic order should occur in a wide range of systems, including frustrated quantum spin chains in applied magnetic field, spin-1/2 frustrated ferromagnets, and thin films of  $^3\text{He}$ . Spin-nematic order has also been discussed in the context of materials as diverse as the layered triangular-lattice magnet  $\text{NiGa}_2\text{As}_4$  the cubic spinel  $\text{CdCr}_2\text{O}_4$ , and the iron chalcogenide  $\text{FeSe}$ . None the less, making a definitive observation of spin-nematic order remains very challenging: because the ground state preserves time-reversal symmetry, it is invisible to the most widely-used probes of magnetic order. In this talk we explore some of the progress which has been made in understanding quantum spin-nematics, addressing three simple questions: what are they, where should you look, and how would you know if you'd found one? As a concrete example, we explore in more detail the spin excitations of spin-nematic states, and how these might be observed in experiment. We also discuss some of the most recent evidence for spin nematic order in the two-dimensional magnets  $\text{BaCdVO}(\text{PO}_4)_2$  and volborthite.

*Host: T42*

*There will be coffee, tea, and cookies in front of the lecture hall at 17.00 h*

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