Thesis topics in theoretical condensed matter physics

Supervisor: Associate professor John Ove Fjærestad

Frustrated quantum antiferromagnets

The magnetic properties of many materials can be modelled in terms of interacting spins on a lattice. Antiferromagnets on two-dimensional lattices have long been of particular interest, an important reason being that many materials have a layered structure consisting of two-dimensional lattice planes that are relatively weakly coupled in the third direction. The most interesting systems tend to have small spins (as then quantum effects are most pronounced) and frustrated interactions (which means that it is impossible for all pairs of interacting spins to minimize their energy). This can give rise to phases characterized by unusual ordering phenomena and to complex phase diagrams as a function of temperature, external magnetic field, and other model parameters. This project involves analytical and numerical work on selected phenomena related to frustrated quantum antiferromagnets.

Familiarity with the use of creation and annhilation operators, at the level obtained e.g. in the course TFY4210 *Kvanteteori for mangepartikkelsystemer* at NTNU, would be advantageous.

For more information, contact John Ove Fjærestad, Department of Physics, NTNU (email: john.fjaerestad@ntnu.no, phone 73593448)