

CONDENSED MATTER THEORY SEMINAR

Subject: **Functional renormalization with pseudofermions as an approach to frustrated quantum magnetism**

Speaker: **Prof. Dr. Johannes Reuther (FU Berlin)**

Date & time: **Friday, November 29th, 2019 at 3:15 p.m.**

Venue: **Seminar room 1.114**

The experimental and theoretical investigation of quantum spin systems has become one of the central disciplines of contemporary condensed matter physics. From an experimental viewpoint, the field has been significantly fueled by the recent synthesis of novel strongly correlated materials with exotic magnetic or quantum paramagnetic ground states. From a theoretical perspective, however, the numerical treatment of realistic models for quantum magnetism in two and three spatial dimensions still constitutes a serious challenge. This particularly applies to frustrated systems, which complicate the employment of established methods. This talk gives an introduction into the pseudofermion functional renormalization group (PFFRG) as a novel approach to determine large size ground state correlations of a wide class of spin Hamiltonians. Using a diagrammatic pseudofermion representation for quantum spin models, the PFFRG performs systematic summations in all two-particle fermionic interaction channels, capturing the correct balance between classical magnetic ordering and quantum fluctuations. Numerical results for frustrated spin models on the two-dimensional kagome and three-dimensional pyrochlore lattice are presented, discussed and benchmarked against other methods if available. A particular focus will be on the fate of pinch point singularities in the classical Heisenberg model on the pyrochlore lattice when the system is tuned to finite spin lengths S .