

**Seminar talk: Ms. Kathinka Gerlinger, November 7<sup>th</sup>, 2018 at 10:30,  
seminar room B (2.6)  
Applicant: PhD position at MBI**

***Implication of network science for understanding quantum  
many-body-systems***

How can we use network science to improve our understanding of quantum many-body systems? The 1D Ising model is a spin model from solid state physics for a kind of magnetism and features a so-called quantum phase transition at  $T = 0$  K between ferro- and paramagnetic phase of spin arrangement. Finding the critical point at which the phase transition occurs is a main challenge of many-body physics. In this talk, the phase transition is determined using methods of network science. To this end, the 1D Ising model with different kinds of interactions is translated to a complex weighted network which in turn is characterized by the network measures density, clustering coefficient, disparity and Pearson correlation coefficient. Furthermore a network motif analysis is performed. The results for the determination of the critical point are for the most part promising and the translation scheme from physical model to network can potentially be used for other theoretical models.