GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Fachbereich Physik
Institut für Theoretische Physik

CONDENSED MATTER THEORY SEMINAR

Subject: **Tensor network simulation of the Kitaev-Heisenberg model at finite termperature**

Speaker: **Dr. Piotr Czarnik (Polish Academy of Sciences, Institute of Nuclear Physics PAN, Kraków, Poland)**

Date & time: **Friday, October 25th, 2019 at 3:15 p.m.**

Venue: **Seminar room 1.114**

Abstract: We investigate [1] the Kitaev-Heisenberg (KH) model at finite temperature using the exact environment full update (eeFU), introduced in Phys. Rev. B 99, 035115 (2019), which represents purification of a thermal density matrix on an infinite hexagonal lattice by an infinite projected entangled pair state (iPEPS). We show that thanks to a dynamical mapping from a hexagonal to a rhombic lattice, the eeFU on the hexagonal lattice is as efficient as the simple full update (FU) algorithm. Critical temperatures for coupling constants in the stripy and the antiferromagnetic phase are estimated. They are an order of magnitude less than the couplings in the Hamiltonian. By a duality transformation, these results can be mapped to, respectively, the ferromagnetic and zigzag phases. %For the special case of the pure Kitaev model, which is tractable by quantum Monte-Carlo but the most challenging for tensor networks, the algorithm is benchmarked against the Monte-Carlo results. It recovers accurately the crossover to spin ordering and qualitatively the one to flux ordering.

[1] P. Czarnik, A. Francuz, J. Dziarmaga. arXiv 1906.02220.