BP 22: Networks: From Topology to Dynamics II (joint DY, BP, SOE)

Time: Thursday 9:30–10:15 Location: H44

Invited Talk BP 22.1 Thu 9:30 H44

Wave localization in complex networks — •Jan W. Kantelhardt[1], Lukas Jahnke[1], Richard Berkovits[2], and Shlomo Havlin[2] — [1]Institut für Physik, Fachgruppe Theoretische Physik, Martin-Luther-Universität Halle-Wittenberg, 06099 Halle (Saale), Germany — [2]Minerva Center and Department of Physics, Bar-Ilan University, Israel

Complex networks can show transitions from phases with propagating modes to localized phases without transport. In the simplest case such a transition is caused by breaking the network, a classical percolation transition. Wave-like excitations, on the other hand, can exhibit a quantum phase transition (Anderson-like transition) already when the network is still intact. We suggest that this type of localization-delocalization transition could become experimentally observable in optical networks composed of fibers and beam splitters on an optical table. We study the phase transition numerically by level statistics of the eigenvalues for coherent waves in scale-free networks. We show that a strong clustering of the links, i. e., a high probability of closed triangles in the network structure, can induce the transition to localized states. Clustering thus represents a new degree of freedom that can be used to induce and study phase transitions in complex networks.