Beitrag 9.5 wird ersetzt durch:

Vortrag 9.5 Fr 16:30 SR 1

Enhancing the quantum transport on the star graph by disorder

•Anastasiia Anishchenko, Alexander Blumen, and Oliver Mülken — Physikalisches Institut, Universität Freiburg

Continuous-time quantum walks (CTQWs) are associated with coherent transport processes of, say, energy, mass or charge and are applicable to many fields of science from polymer physics to quantum computation. It has been shown in [1] that transfer processes depend on the network topol- ogy. The symmetry of the networks such as stars or rings can be destroyed by adding randomly B additional bonds, see, e.g., Ref. [2]. This creates shortcuts, and a walker can find shorter ways between pairs of nodes. In the following, we randomly add bonds to the star graph (forbidding so-called self- and double-connections), and investigate the transition from the star graph to the complete graph [3].

[1] O. Mülken and A. Blumen, Phys. Rev. E 71, 066117 (2006).

[2] O. Mülken, V. Pernice, and A. Blumen, Phys. Rev. E 76, 051125 (2007).

[3] A. Anishchenko, A. Blumen, and O. Mülken, QIP 11, 1273 (2012).

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Vortrag 24.5 So 12:45 HS 1

Neutron Compton scattering: An analysis of basic assumptions

•Ingmari C Tietje — Institute of Physics, Technische Universität Berlin, Hardenbergstraße 36, 10623 Berlin

An analysis of the basic assumptions of the conventional neutron scattering theory - the van Hove formalism - is presented as well as the basic assumptions of the impulse approximation (IA) which provides the theoretical framework of neutron Compton scattering (NCS). NCS is also known as deep inelastic neutron scattering (DINS).

The IA is assumed to comprise the essential physical features of NCS and is based upon the conventional neutron scattering theory.

The following two main points are analyzed: (A) possible physical constraints of the applicability of the δ-function in the NCS context and (B) the transition from the N-body to the effective one-body picture in the impulse approximation (IA).

In the subsequent discussion the focus lies on the interplay of the basic assumptions of both theories and possible experimental constraints. The points (A) and (B) among others are coherently discussed.

Moreover, the validity of the incoherent approximation and the short-time expansion of the Heisenberg position operators r(t) essential to the impulse approximation (IA) are questionend.

Intrinsic difficulties or contradictions between some of the assumptions of the conventional neutron scattering theory and those of its specification to NCS - the IA - are revealed - especially involving point (A).

It becomes obvious that the conventional neutron scattering theory, per definition, excludes quantum phenomena like decoherence and entanglement which are likely to be of high importance in the ultra-short (attosecond) time scales of NCS.