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Transport in clean and disordered spin chains

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Spin chains represent interesting quantum many-body systems, well realized in several novel materials. In spite of long history, there remain theoretical questions, in particular regarding the finite-temperature transport in such systems, also in relation to recent experiments on thermal conduction in such materials revealing long mean free paths and impurity dominated transport at low T. Theoretical understanding of transport in clean and disordered spin chains will be reviewed in the talk. T>0 spin stiffness will be discussed in connection with the integrability of the model. In particular, the interplay of electron correlations and random static disorder will be analysed with respect to possible many-body Anderson localization. It will be shown that a single static impurity as well as coupled impurity spins at T>0 lead to the incoherent transport with a well defined current relaxation rate, allowing also for either cutting or healing effect.