



Mathematics and CS Seminar

Quantum groups as hidden symmetries of quantum impurities

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Host: Laszlo Erdős

We present an approach to interacting quantum many-body systems based on the notion of quantum groups, also known as q -deformed Lie algebras. In particular, we show that if the symmetry of a free quantum particle corresponds to a Lie group G , in the presence of a many-body environment this particle can be described by a deformed group, G_q . Crucially, the single deformation parameter, q , contains all the information about the many-particle interactions in the system. We exemplify our approach by considering a quantum rotor interacting with a bath of bosons, and demonstrate that extracting the value of q from closed-form solutions in the perturbative regime allows one to predict the behavior of the system for arbitrary values of the impurity-bath coupling strength, in good agreement with non-perturbative calculations. Furthermore, the value of the deformation parameter allows to predict at which coupling strengths rotor-bath interactions result in a formation of a stable quasiparticle. The approach based on quantum groups does not only allow for a drastic simplification of impurity problems, but also provides valuable insights into hidden symmetries of interacting many-particle systems.

Thursday, December 20, 2018 04:00pm - 06:00pm

IST Austria Campus Big Seminar room Ground floor / Office Bldg West (I21.EG.101)



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