ICTS Seminar

Title : A simple proof of 1d LSM theorems

Speaker : Abhishodh Prakash, International Centre for Theoretical Sciences

Date : Wednesday, January 22, 2020

Time : 4:30 PM

Venue : Nambu Right Discussion Room, ICTS Campus, Bangalore

Abstract : Determining the low-energy properties of strongly coupled quantum many-body systems is generally a hard task except for a few notable exceptions: 1. In 1961, Lieb, Schults and Mattis (LSM) proved that the 1D spin-half Heisenberg quantum antiferromagnet (QAF) is gapless. 2. In 1969, Majumdar and Ghosh showed that with next-nearest neighbor coupling, the QAF gaps out with a two-fold degeneracy. 3. In 1983, Haldane argued that the result of LSM applies to all half-odd-integer QAFs. I will collectively refer to the generalizations of these results as LSM theorems.

In this talk, based on an upcoming paper, I will argue that in 1D, LSM theorems can be easily proved purely based on kinematic considerations of global symmetries and their on-site representations. This exploits powerful results due to the availability of matrix product state representations and a generalization of the well known Wigner Eckart theorem.