T_CSUH Special Seminar

Texas Center for Superconductivity at the University of Houston

Dr. Yan Chen

Department of Physics and Lab of
Advanced Materials
Fudan University, Shanghai
CHINA

Exploring Quantum Phase Transitions in Quantum Spin Chains

March 8, 2012
Room 102, University of Houston Science Center
4:00 – 5:00 pm

Abstract

In recent years, quantum phase transitions (QPTs) have attracted great interest both theoretically and experimentally. In this talk, I would like to address the following two issues on QPTs in quantum spin chains. In part I, we establish a Z2 topological invariant characterization of QPT in XY spin Chain. As we know, QPT in such system belongs to the Landau's symmetry breaking paradigm. By employing the twist boundary conditions, we construct a many-body Z2 topological invariant in XY spin chain and Heisenberg-Ising chain. This novel topological invariant can be used to characterize the QPT, and is robust against weak randomness. In part II, we demonstrate that the classical noise spectra may provide an efficient and straightforward way to detect the QPT points in quantum spin chains. In the non-Markovian region, the time evolutions of physical observables exhibit distinct behaviors for different quantum phases. In addition, we may choose the "optimal" noise to detect peculiar quantum phase. This method can determine faithfully the QPT points of the transverse Ising chain as well as spin-1 bilinear-biquadratic Heisenberg chain.

Bio

Yan Chen is now a professor at Fudan University. He received his BS and Ph.D. in theoretical physics from Nanjing University in China. Thereafter he conducted postdoctoral research at the University of Houston (1998-2003) under the guidance of Professors W. P. Su and C. S. Ting. Between 2003 and 2007, he was employed as research assistant professor as well as honorary assistant professor at the University of Hong Kong. Since then he has moved to Fudan University as a professor of special appointment. His current research interests include high temperature superconductivity, exotic superfluidity in ultracolor atoms, quantum entanglement and quantum phase transitions. He has published more than 40 papers in peer review journals.

Persons with disabilities who require special accommodations in attending this lecture should call (713) 743-8210 as soon as possible.

TcSUH