



Institute for Research in
Fundamental Sciences

Condensed Matter Lecture

SUPERCONDUCTOR-INSULATOR TRANSITION AND QUANTUM PHASE TRANSITION IN DISORDERED BOSONIC THEORIES

Speaker: Dr. Kamran Kaveh
Simon Fraser University, Canada

Monday & Wednesday

2 & 4 Mordad 1391

Time: 14:00-15:30

In this talk, we begin by a brief introduction of quantum phase transitions in condensed matter theories and discuss differences and similarities with classical phase transitions. Then we turn into the Superconductor-Insulator transition (SI) as an interesting example of quantum phase transitions in low dimensional condensed matter theories. We present the bosonic effective theories such as Bose-Hubbard model for SI transition and derive the phase diagram of the Bose-Hubbard and XXZ models in the mean field limit for both pure and disordered cases. We show that quantum phase fluctuations are enhanced by introduction of quenched disorder and will lead to a new intermediate glassy phase (Bose glass) which is absent in the mean field treatment. At the end, we discuss the scaling properties of the transition and show a renormalization group approach for such category of quantum phase transitions.

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