

ICTS Seminar

Title : Study of fermionic superfluid state in “clean” and “dirty” bilayer optical lattice systems circumventing the “cooling problem”

Speaker : Yogeshwar Prasad, Harish-Chandra Research Institute, Allahabad

Date : Friday, January 19, 2018

Time : 11:30 AM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : The advancement in the field of cold atoms has seen a roadblock for fermions in optical lattices due to the cooling problem. To circumvent the cooling problem for fermions in optical lattice systems we propose a model whose idea hinges on a low-entropy band-insulator state, which can be tuned to superfluid state by tuning the on-site attractive interaction by Feshbach resonance. We show through Gaussian fluctuation theory that the critical temperature that can be achieved is much higher in our model as compared to the single-band Hubbard model. We give a proposal for its realization in the optical lattice experiments. Through DQMC simulations we performed a detailed analysis of the pair and density correlations and mapped out the full T - U phase diagram. We have studied the effect of on-site random disorder in our system and see the suppression of the pair correlations as we increase the disorder strength.