# ICTS Seminar

Title : Heat transfer mechanisms across a vacuum gap exceeding Planck's blackbody limit

Speaker : Karthik Sasihithlu, Blackett Laboratory, London

Date : Monday, October 16, 2017

Time : 11:00 AM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : Over the last decade there has been plenty of theoretical and experimental interest in analyzing heat transfer between two bodies brought in close proximity to each other, but separated by a vacuum gap, primarily because a several-fold enhancement in heat transfer beyond the Planck's blackbody limit has been observed. In this talk, I will describe two mechanisms by which such an enhancement is possible:1) photon tunnelling and 2) acoustic phonon transmission. While the dependence of photon tunnelling on the gap between two planar objects is well understood, effect of curvature is unclear. In particular, the relevance of an approximate method (called proximity approximation) to predict the near-field interaction between curved bodies is disputed. Based on the results from a first-principles calculation of near-field heat transfer between two spherical objects, a modified form of proximity approximation method is proposed to resolve the discrepancy between theoretical predictions and experimental observations. Bulk acoustic phonons, being lattice vibrations, need a material medium to propagate. However, for small vacuum gaps the van der Waals force between two planar surfaces can assist in phonon transmission across a vacuum gap thereby opening up new channels for heat transfer.