

ICTS Skype Seminar

- Title : Trans-Planckian issues and Emergent Gravity: from Bose- Einstein condensates (BEC) to analogue Black Holes
- Speaker : Supratik Sarkar, Indian Institute of Science Education and Research, Pune
- Date : Thursday, 21 December 2017
- Time : 10:00 AM
- Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore
- Abstract : To account for the nonlocal interactions in a Bose-Einstein Condensate (BEC), an addition of a minimal correction term to the standard Gross-Pitaevskii model effectively can make the healing length ξ decrease more rapidly with the increase of s -wave scattering length a . From emergent gravity perspectives, this shrinking of ξ via tuning a through Feshbach resonance, in principle, does make the short-wavelength (i.e. high energy) regime more accessible experimentally. The effects of the Lorentz-breaking quantum potential term in the BEC-dynamics on independent multiple scales can be captured through a UV-IR coupling of the phonon-excitation-modes with the emergence of the massive minimally coupled free Klein-Gordon field. On a (3+1)D flat spacetime, the presence of the mass term gives a hint to cure the IR divergences. The analysis was extended for a canonical acoustic black hole on a (3+1)D curved spacetime through presenting an emergent gravity model up to order ξ^2 accuracy. In our formalism, we showed to retrieve the lost information regarding the originally Hawking radiated quanta in a (3+1)D canonically curved background.