INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
2A&B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Seminar Notice

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School of Physical Sciences

Title:	**Trans-Planckian issues & Analogue Gravity: From BEC to acoustic Black Holes**
Speaker:	**Supratik Sarkar,Department of Physics, IISER, Pune**
Date:	**September 20, 2018 (Thursday)**
Time:	**4:00 p.m.**
Venue:	**Physics Seminar Room (C406),3rd Floor, Centenary Building, IACS**
Abstract:	To account for the non-local interactions in a Bose-Einstein Condensates (BEC), an addition of a minimal correction term to the standard Gross-Pitaevskii model effectively can make the healing length or characteristic length (ξ) decrease more rapidly with the increase of *s*-wave scattering length (*a*). From analogue gravity perspectives, this shrinking of ξ via tuning *a* through Feshbach resonance, in principle, does make the short-wavelength (high energy) regime more accessible experimentally by pushing the Lorentz-breaking dispersion even more towards the UV side [1]. 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 a massive minimally coupled free Klein-Gordon field. The analysis was argued on a (3+1)D flat spacetime where the presence of the mass term gives a hint to cure the infrared divergences through a nonzero threshold for the large-wavelength phonon excitations on lower dimensional models of analogue spacetimes [2]. The analysis was extended for a canonical acoustic black hole on a (3+1)D curved spacetime through presenting an analogue gravity model up to $\mathcal{O}(\xi^{2})$ accuracy. In our formalism, the growth rate of the large-wavelength `secondary' $\omega$ modes is found to hold the clue to extract the lost information regarding the short-wavelength `primary' ω_{1} modes. And hence this can actually reveal the relative abundance of the originally Hawking radiated quanta in a (3+1)D canonically curved background [3].

1. Supratik Sarkar and A. Bhattacharyay, Journal of Physics A: Mathematical and Theoretical 47, 092002 (2014)
2. Supratik Sarkar and Arijit Bhattacharyay, Phys. Rev. D 93, 024050 (2016)
3. Supratik Sarkar and A. Bhattacharyay, Phys. Rev. D 96, 064027 (2017) |

All are cordially invited to attend the seminar