



## **ICTS Condensed Matter Seminar**

**Title** : Effective General Relativistic Description of Jamming in Granular Matter

**Speaker** : Parthasarathi Majumdar (Indian Association for the Cultivation of Science, Kolkata)

**Date** : Wednesday, 11<sup>th</sup> October, 2023

**Time** : 11:30 AM (IST)

**Abstract** : We propose here that certain observational features of granular matter in the infrared limit, exhibiting the phenomenon of jamming, arise from an underlying effective general relativistic de-scription. The proposal stems from the assumption (which we justify on physical grounds) that grains in granular matter move freely in an effective curved Riemannian space. The termination of their trajectories at the onset of jamming is obtained from the focussing of a converging congruence of geodesics in such a space, as a solution of the Raychaudhuri equation for such congruences. This may happen irrespective of whether or not the curvature is sourced by external stresses (via an effective Einstein equation), although the properties of the resultant jammed state solution do differ in the two cases. A definite prediction of this geometrical approach is the negative role played by those trajectories which twist about each other, in reaching the jammed state. The local symmetries of granular interaction, translational and rotational invariance (corresponding to ‘force balance’ and ‘torque balance’ in standard force-based approaches to jamming) are inherent in the effective general relativity framework.

**Venue** : **Offline:** Madhava Lecture Hall

**Online:** Please click on the below link to join the seminar

<https://icts-res-in.zoom.us/j/86349260431?pwd=6iasw4Yg2YVpOLAvopOh4rp9i5vzJH.>