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## **ICTS Seminar**

Title : Particles in turbulent flows: a model system to understand rain and planet formation

Speaker : Akshay Bhatnagar, NORDITA- Nordic Institute for Theoretical Physics, Stockholm

Date : Monday, November 25, 2019

Time : 11:00 AM

Venue : Emmy Noether Seminar Room

Abstract : Turbulent flows in nature often have small particles embedded in them. Two canonical examples are gas flows in proto-planetary disks with small dust particles and air flows in a cloud with small water droplets. The first one controls the physics of the formation of planetesimals – small kilometre size objects that themselves collide and merge to form planets. The second one controls the physics of rain formation. In both these systems, small particles collide and merge to form larger objects. In order to understand this process of collision and coalescence, we study the relative motion of two nearby heavy particles advected by a turbulent flow. We find that the probability distribution of the relative velocity of two particles has a power-law tail. This indicates very high relative velocity and collision rates for the particles. We compute the joint probability distribution function (JPDF) of separation and their relative velocity. We find that at small separations this JPDF is independent of the separation, this is due to the singularities referred as caustics, appearing in the velocity field of the particles.