ICTS | INTERNATIONAL CENTRE for THEORETICAL SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Colloquium

Title : Beat, sync, and wave: nonlinear dynamics of flagella and cilia

Speaker : Brato Chakrabarti (Flatiron Institute, Simons Foundation)

Date : Tuesday, 13th December 2022

Time : 03:00 pm (IST)

Abstract : An important class of microscale fluid-structure interactions in biology involves the interactions and deformations of flexible elastica, both passive and active, with ambient fluid flows. Examples include the swimming of microorganisms using internally actuated cilia or flagella and the transport of material by the coordinated action of ciliary carpets. How the action of nanometric molecular motors that actuate such filaments coordinates emergent behavior spanning hundreds of microns remains an open question. I will address this by focusing on the nonlinear hydrodynamics of cilia and flagella. First, I will discuss a biophysical model of a spontaneously beating cilium that incorporates various details of their microscopic physics. Building on this, I will illustrate the role of biochemical noise and hydrodynamic interactions in the synchronization of a pair of flagella and, ultimately, elucidate how beds of beating cilia can spontaneously self-organize. This work has implications for understanding fundamental biological problems, such as vertebrate symmetry-breaking.

Venue : **Hybrid talk**

Offline: Emmy Noether Seminar Room

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

https://icts-res-in.zoom.us/j/84890206852?pwd=Z0tiZ1JZUFZXREZpak9sMEVsR0lwQT09
Meeting ID: 848 9020 6852
Passcode: 121312