

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

INTERNATIONAL

CENTRE *for* Theoretical

## **ICTS Biophysics Seminar (HYBRID)**

- **Title** : Networks, forces, and transitions: A synthetic approach to understand axial emergence in multicellular systems
- **Speaker** : Vikas Trivedi (EMBL Barcelona)
- **Date** : Thursday, 2<sup>nd</sup> February 2023
- **Time** : 10:00 am (IST)
- How can tissue shapes and patterns emerge reproducibly and robustly in multicellular Abstract : systems like animals? Despite more than 100 years of embryology, it still remains unclear how gene networks, forces and mechanical properties and themetabolic state of the cells integrate together to self-organize complex structures. This is due to our inability to disentangle the combined action of these factors (biophysical properties, gene networks and metabolic activity) within populations of genetically equivalent cells. In our work we focus on understanding the interplay of these factors within the context of the establishment of body axes in metazoans. We take advantage of aggregates of embryonic stem cells (ESCs) that recapitulate hallmarks of early embryonic development in vitro and probe the first symmetry breaking event that establishes anteroposterior polarity. By means of quantitative live imaging, mechanical measurements, single-cell sequencing, molecular perturbations and mathematical modelling, we show that the mesodermal transcription factor Brachyury (Bra/T) controls tissue rheology and the patterning proportions of ESC aggregates through a mechanochemical coupling between cell signaling and cell sorting. We further explore the role of metabolism in symmetry breaking and germ layer specification that along with timely emergence of distinct biophysical properties, moulds the tissue. Altogether, our results allow us to investigate how differentiation trajectories in vivo and in vitro can converge onto similar cell fates through coordinated changes in signaling, metabolic states and biophysical properties.
- **Venue** : Feynman Lecture Hall (ICTS) and Online

Please click on the below link to join the meeting.

https://icts-res-in.zoom.us/j/88304796896?pwd=R3l2Mk1iK0RqeFlWUXQ4c2x6N281UT09 Meeting ID: 883 0479 6896 Passcode: 020223