

## **ICTS Seminar**

- Title** : Dynamics and fragmentation of small flexible fibers in turbulence
- Speaker** : Sofia Allende, Université de la Côte d'Azur MINES ParisTech, CEMEF Sophia-Antipolis, France
- Date** : Friday, July 12, 2019
- Time** : 2:30 PM
- Venue** : Emmy Noether Seminar Room, ICTS Campus, Bangalore
- Abstract** : The dynamics of small flexible, inextensible fibers in a turbulent flow is found to follow most of the time that of a stiff rod. Deviations occur when the fibers experience a strong-enough compression and buckle. Such events are very rare and intermittent because of the long-term Lagrangian correlations of turbulent velocity gradients. We investigate the consequence of such a dynamics on fiber fragmentation. We explicitly investigate two break-up mechanisms : tensile failure and flexural failure, which respectively correspond large values of the local tension and large values of the curvature. The simplest fragmentation process is due to tensile failure, which solely depends on the fluctuations of the turbulent flow. Conversely, flexural failure can only occur when the fiber buckles. Fragmentation processes due to the flexural failure are hence determined by the most excited buckling mode and thus have an intricate dependence on the fiber flexibility. We study this dependence through the linear stability of the Slender Body theory. We use DNS data to identify the key parameters. This allows us to construct dynamical models that explain the statistics of the fragmentation process, and in particular reproduce the evolution of the fiber-length distribution.