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ICTS Seminar

- Title : Odd viscosity in chiral active fluids
- Speaker : Debarghya Banerjee, Instituut-Lorentz for theoretical physics,
Leiden University
- Date : Thursday, September 21, 2017
- Time : 11:30 AM
- Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore
- Abstract : Chiral active fluids are materials composed of self-spinning rotors that continuously inject energy and angular momentum at the microscale. Out-of-equilibrium fluids with active-rotor constituents have been experimentally realized using nanoscale biomolecular motors, microscale active colloids, or macroscale driven chiral grains. In this talk I will discuss how such chiral active fluids break both parity and time-reversal symmetries in their steady states, giving rise to a dissipationless linear-response coefficient called odd viscosity in their constitutive relations. Odd viscosity couples pressure and vorticity leading, for example, to density modulations within a vortex profile. Moreover, chiral active fluids flow in the direction transverse to applied compression as in shock propagation experiments. We envision that this collective transverse response may be exploited to design self-assembled hydraulic cranks that convert between linear and rotational motion in microscopic machines powered by active-rotors fluids.