

ICTS Seminar

- Title : On the Construction and Dynamics of Knotted Fields
- Speaker : Hridesh Kedia, University of Chicago, USA
- Date : Thursday, June 8, 2017
- Time : 2:30 PM
- Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore
- Abstract : A knot---a closed loop tangled with itself, which can not be untangled without cutting the loop---preserves its identity when stretched or rotated. Remarkably, knots in the vortex lines of a dissipationless fluid, or in the magnetic field lines of an infinitely conducting plasma, stretch and rotate as they evolve, but never untangle, persisting forever. A consequence of this topology-preserving evolution, is an additional conserved quantity: helicity, which has far-reaching implications for the dynamics of fluids and plasmas. Seeking a better understanding of the persistence of knots, and the ensuing conservation of helicity, we begin by analytically constructing knotted vector fields. We then study if knots can persist in a linear theory such as Maxwell's equations. Lastly, we ask if an additional conserved quantity analogous to helicity exists in superfluids since they also flow without dissipation.