ICTS Colloquium

Title : Augustin Cauchy and Hermann Hankel, pioneers of Lagrangian fluid dynamics

Speaker : Uriel Frisch, Laboratoire Lagrange, OCA, Universite Cote d'Azur

Date : Monday, December 19, 2016

Time : 3:00 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : In the Lagrangian representation, fluid particles are characterized in terms of the time dependent Lagrangian map.This is of obvious interest in following tracers in geophysical flow. But is also at the core Arnold's (1966) formulation of incompressible Euler flow as geodesics of SDiff, the set of volume-preserving diffeomorphisms. Actually, the Lagrangian properties of flow tend to be much nicer than their Eulerian counterparts. For example they have time-analytic trajectories with only limited smoothness of the initial data.

Major work on the Lagrangian description was done by Cauchy (1815) and Hankel (1861). Recently, we found that Hankel's Prize manuscript contains manjor discoveries: the first variational formulation in terms of the Lagrangian map for barotropic flow, the first derivation of the conservation of circulation, the first fully Lagrangian approach to the Helmholtz vorticity theorem and to the description of flows in terms of Clebsch variables. As Riemann wrote in his report on Hankel: "all manners of good things."