ICTS Colloquium

Title : Super-rotating Banana cells and suppression of large-scale convection in the Sun

Speaker : Shravan Hanasoge, Tata Institute of Fundamental Research, Mumbai

Date : Monday, January 28, 2019

Time : 3:00 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : Convection in the Sun, responsible for thermal transport in 30% its outer envelope, generates fluid turbulence, in turn thought to drive large-scale phenomena such as differential rotation, meridional circulation, and the global magnetic cycle. Inferring convective motions in the optically inaccessible solar interior is thus of major interest. Applying a novel method of helioseismology to 8 years of space-based solar observations, we infer the spectrum of toroidal convective flows as a function of spatial wavenumber, temporal frequency up to some depth in the solar interior. We detect “banana cells”, i.e. north- south-aligned flow systems, confirming long-anticipated by theoretical arguments and numerical simulations. In contrast to simulations, observed velocity power weakens with decreasing spatial wavenumber and temporal frequency, indicating that large scales of solar convection are suppressed. Velocity amplitudes peak at the surface, reducing rapidly with depth in the outermost layers and more gradually in deeper layers, possibly marking a transition from surface to deep convection.