Tata Institute of Fundamental Research
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Internal Seminar

Time Evolution of Intermittency in the Passive Slider problem

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The statistical systems driven out of equilibrium can be of various types. Especially interesting are states which exhibit intermittency, characterized by sudden bursts of activity followed by long periods of low activity. Intermittent states are ubiquitous in nature, and are found in various physical problems ranging from the spatial structure of the universe and studies of turbulent flows, to mathematical models of biological systems, at cellular and macroscopic scales. Here we focus on an important question: how is an intermittent steady state approached in time, starting from a random initial condition? We first consider a non-interacting passive particles sliding down on a one-dimensional Kardar-Parisi-Zhang (KPZ) surface evolving via stochastic dynamics. We find that the approach to steady state involves an indefinitely growing length scale, which underlies a scaling description of particle clustering. Considering a simpler model of sticky sliders, we obtain scaling forms and corresponding exponents in different regimes for the time-dependent flatness and hyper-flatness, both measures of intermittency, and these are confirmed numerically. Aging properties are studied via a two-time flatness. We predict and verify numerically that it is, remarkably, a non-monotonic function of time, with different scaling forms at small and large time. Scaling description for all the regimes are also studied to apply when clustering is more diffuse, as for passive sliders driven by an Edwards-Wilkinson (EW) surface. Finally, we study the spatial intermittency of the particle number for both KPZ and EW driving.

Monday, Sep 11th 2017

04:00 PM (Tea/Coffee at 03:45 PM)

Auditorium, TIFR (FReT-B)