# abstract

Joint Princeton Mathematical Physics Seminar
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

We consider a passive scalar field under the action of pumping, diffusion and advection by a smooth flow with a Lagrangian chaos. We present theoretical arguments showing that scalar statistics is not conformal invariant and formulate new effective semi-analytic algorithm to model the scalar turbulence. We then carry massive numerics of passive scalar turbulence with the focus on the statistics of nodal lines. The distribution of contours over sizes and perimeters is shown to depend neither on the flow realization nor on the resolution (diffusion) scale $r_d$ for scales exceeding $r_d$. The scalar isolines are found fractal/smooth at the scales larger/smaller than the pumping scale $L$. We characterize the statistics of bending of a long isoline by the driving function of the L\"owner map, show that it behaves like diffusion with the diffusivity independent of resolution yet, most surprisingly, dependent on the velocity realization and the time of scalar evolution.