Students' Annual Seminar

Extreme Value Statistics in Structural Glasses

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The amorphous state of the matter has been a subject of extensive study for the last few decades. One often tries to understand the dynamical behaviour of such systems within the landscape approach, where it is assumed that the system vibrates in a given potential energy minimum and then hops to other accessible minima. This vibration and hopping between different minima characterise the system's dynamics. Such a picture is known to be an excellent effective description of these complex systems. The vibration in a given local minimum can be understood if the dynamical matrix (Hessian) is known, and we probe the statistics of its relevant, minimum eigenvalue. In previous studies on mean-field glass models, critical temperatures show extreme value statistics, particularly the Tracy-Widom (TW) distribution, and it was argued that this information is carried in the minimum eigenvalue of the Hessian, which, consequently can be thought of as a random matrix belonging to the Gaussian Orthogonal Ensemble (GOE). We attempt to test some of these ideas for structural glasses, and find that the Hessians of model structural glasses probably do not belong to GOE and the underlying distributions of minimum eigenvalue seems to not be strictly TW, but instead shows interesting system size effects.

Monday, Mar 19th 2018

04:30 PM (Tea/Coffee at 03:30 PM)

Seminar Hall, TIFR-H