Seminar

Institute for Plasma Research

Title : Dynamics on spatially extended systems

Speaker : Dr. Promit Moitra
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Date : 3rd November , 2020 (Tuesday)

Time : 03:30 PM

Venue : Online- Join the talk:

https://meet.ipr.res.in/PDFextensiontalkPromitMoitra

Abstract:

There will be two components to this talk –

1) Cellular automaton model of excitable dynamics on a 2D lattice: A seminal study in 1978, by J. M. Greenberg and S. P. Hastings, established the utility of cellular automaton models for studying the dynamics of excitable media. Since then it has been used in multiple contexts, from modeling infections to chemical reactions, typically processes involving local contact based spreading. It has been observed that such models evolve towards two asymptotic regimes - self sustained oscillations or cessation of activity. In this study we attempt to correlate the dynamical properties of the medium to the asymptotic state of the system, and extract the conditions under which the system would evolve to either regime in the long run.

2) Adaptive coupling of logistic maps on a 1D lattice: The coupled map lattice formalism has enabled the exploration of a rich variety of emergent behaviors exhibited by spatially extended systems of dynamical units. Such systems consist of individual periodic or chaotic units with a continuous state space and a discrete spatial and temporal structure. In this study, we investigate the effect of introducing a form of coupling between units which adapts its strength according to the state of the units. Preliminary observations in the chaotic regime has demonstrated the existence of states that simultaneously support periodic and chaotic oscillations in spatially localized regions.
