Stuttgarter Physikalisches Kolloquium

Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme
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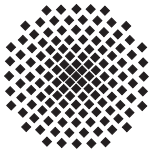

Dienstag, 14. Juli 2015 | **17.15 Uhr** | **Hörsaal 2 D5**

Stuttgarter Max-Planck-Institute, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

Synchrony and turbulence in coupled oscillatory and noisy bistable system

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Abstract

Synchronization is a key property of coupled oscillators: Nonidentical oscillating elements with a distribution of natural frequencies adopt a common frequency, due to the mutual coupling. However, often synchronization is not complete, and other forms of order emerge spontaneously, ranging from cluster patterns, i.e. the formation of several groups of fully synchronized oscillators that posses a defined phase difference to the others, to so-called chimera states, where a synchronized group of oscillators coexists with an unsynchronized one, a state which even exists in ensembles of *identical* oscillators.
In this talk, I will first present experimental examples for various kinds of synchronization patterns observed in an oscillatory photo-electrochemical experiment, namely the electrooxidation of n-type silicon. Then, using a prototypical model equation, a modified complex Ginzburg-Landau equation, I will discuss the prerequisites on the coupling between the oscillators (or within the oscillating medium) necessary for the emergence of the different states, in particular of chimera states. Finally, I will present a different type of synchronization experiment: Bistable electrochemical reactions proceeding on a microelectrode exhibit intrinsically noisy states. When such noisy electrodes are globally coupled, the ensemble of bistable elements exhibits a coherent oscillation.