



Berlin Center for Studies of Complex Chemical Systems e. V.

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Max-Delbrück-Centrum für Molekulare Medizin, Otto-von-Guericke-Universität
Magdeburg, Physikalisch-Technische Bundesanstalt, Technische Universität
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Seminar

Complex Nonlinear Processes in Chemistry and Biology

Honorary Chairman: **G. Ertl**

Organizers: **M. Bär, C. Beta, H. Engel, M. Falcke, M. J. B. Hauser, A. S. Mikhailov, P. Plath, L. Schimansky-Geier, H. Stark**

Friday, 15th July 2011, 16:00 s.t.

Prof. Raul Toral

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Collective firing induced by disorder in excitable systems: non-universal behavior

Abstract

Excitable behavior, characterized by a nonlinear response under external perturbations (only those exceeding a threshold induce a full system response or firing) appears in a large variety of physical, chemical, and biological systems. In extended systems, coherent pulsations, where a macroscopic fraction of the units fire simultaneously, can appear provided that there is some level of disorder (induced by noise or heterogeneity, for example) and we have developed a theory to explain generically this paradoxical result (collective motion arising out of disorder). In a system of coupled active-rotators (a paradigm for excitable behavior) the transition to collective firing is found generically for any distribution with well-defined moments but, singularly, it does not appear for the Lorentzian distribution (widely used in this context for its analytical properties). This warns about the use of Lorentzian-type distributions to understand the generic properties of coupled oscillators.

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