SFB 910 Symposium

“Pattern formation and coherent structures in dissipative systems”

Friday, 14th January 2022, 15:00 s.t.
via Zoom
For information on how to access the event, please contact:
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Straße des 17. Juni 135, 10623 Berlin

15:00 **Action Potentials in Action**
Jens Rademacher *(Uni Bremen)*

16:00 **Energy approach for a coupled reaction-diffusion system on the real line**
Stefanie Schindler *(WIAS Berlin)*

16:30 **Steering the pattern formation of dewetting liquids**
Dirk Peschka *(WIAS Berlin)*

Guests are welcome!

Sabine Klapp Bernold Fiedler Alexander Mielke

http://www.itp.tu-berlin.de/sfb910/

Abstracts

Action Potentials in Action

Jens Rademacher *(Uni Bremen)*

Action potentials act as information bits between neurons and in more general form in excitable media, such as heart tissue, reacting gels and low pressure catalysis. They appear in idealised mathematical models as solutions that are steady and spatially localised in a comoving frame. The information transfer can be disturbed due to interaction of action potentials while travelling and also due to splitting of action potentials. This has been experimentally observed in pathological neurons and numerically in various mathematical models, such as the famous FitzHugh-Nagumo (FHN) equations.

In this talk I will first discuss some recent insights into pulse replication with focus on FHN. In a second part I will switch to simpler scalar phase models for excitable media and discuss weak and strong interactions. Finally, I will consider yet simpler fully discrete cellular automaton models and discuss aspects of long term interaction dynamics.

The talk draws from joint works with Paul Carter (Irvine), Björn Sandstede (Providence), Marc Kesseböhmer (Bremen), Antoine Pauthier (Paris), and Dennis Ulbrich (Bremen).

Energy approach for a coupled reaction-diffusion system on the real line

Stefanie Schindler *(WIAS Berlin)*

In this talk, we investigate the long-time behavior of solutions to anonlinear coupled reaction-diffusion system with detailed balance on the real line. By assuming that the solutions are in equilibrium atinfinity, we study the convergence towards a generalized steady-state in self-similar variables. The idea is to use an entropy approach, which is a standard method for reaction-diffusion systems of mass-action type on bounded domains and a robust alternative to the linearization around an equilibrium. While this approach is well-studied on bounded domains, things become more complicated on the whole real line.

Steering the pattern formation of dewetting liquids

Dirk Peschka *(WIAS Berlin)*

On small length scales, there are many examples of physical systems whose dynamics is driven by the same energy, but where the dissipation decides the trajectory of the system and thus controls structure formation effects. For dewetting fluids, the driving energy is the surface tension and the dissipative effects are related to viscous friction, to Navier-slip friction, and to contact line friction. In my talk, I discuss how these dissipative effects can influence the structure formation of dewetting process