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“Universal features of cell polarization processes”

Cell polarization plays a central role in the development of complex organisms. It has been recently shown that cell polarization may follow from the proximity to a phase separation instability in a bistable network of chemical reactions. An example which has been thoroughly studied is the formation of signaling domains during eukaryotic chemotaxis. In this case, the process of domain growth may be described by the use of a constrained time-dependent Landau-Ginzburg equation, admitting scale-invariant solutions à la Lifshitz and Slyozov. The constraint results here from a mechanism of fast cycling of molecules between a cytosolic, inactive state and a membrane-bound, active state, which dynamically tunes the chemical potential for membrane binding to a value corresponding to the coexistence of different phases on the cell membrane. We provide here a universal description of this process both in the presence and absence of a gradient in the external activation field. Universal power laws are derived for the time needed for the cell to polarize in a chemotactic gradient, and for the value of the smallest detectable gradient. We also describe a concrete realization of our scheme based on the analysis of available biochemical and biophysical data.

Dienstag, 09. Dezember 2008, 14 Uhr c.t.

Gebäude E2 6, Seminarraum E.04

Alle Interessenten sind herzlich eingeladen.

Die Sprecher des Graduiertenkollegs
Manfred Lücke und Ludger Santen

**Strukturbildung und Transport
in komplexen Systemen**