# FIM Nachdiplomvorlesung

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## Self-organized dynamics. From emerging consensus to hydrodynamic flocking

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**Abstract**

We study the dynamics of systems driven by the ‚social engagement' of agents with their neighbors. Prototype models are found in opinion dynamics, flocking, self-organization of biological organisms and rendezvous of mobile systems.
Two natural questions arise in this context, namely, what is the large time behavior of such systems, and what is the effective dynamics for large crowds of agents.
The underlying issue of the first question is how different rules of engagement influence the formation of clusters, and in particular, the emergence of ‚consensus'. Different paradigms of engagement yield different patterns. The tendency ‚to move ahead' leads to the emergence of leaders, and ‚to move around' may lead to synchronization. Different descriptions of collective dynamics arise in the context of the second question when the number of agents tends to infinity, with the formation of Dirac masses at the kinetic level of description, and critical thresholds at the level of flocking hydrodynamics.
In recent years there has been extensive activity in analyzing the self-organization of these systems. We will discuss recent developments and present open problems.

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