

# Collective animal behavior: swarm, flock and traffic jam formation

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It is now generally accepted that the behavior of animal groups such as swarms of insects, flocks of birds or traffic jams can be considered as a particular example of non-equilibrium behavior of many-particle systems and that many phenomena such as non-equilibrium phase transitions, dynamical bifurcations, noise-induced pattern formations are inherent features of collective animal motion. The collective character of animal group motion is due to agent-agent correlation effects originated from an agent endeavor to avoid collisions with other moving agents and to adopt the same direction and velocity as its neighbors.

In this talk some examples of collective animal motion are discussed and their theoretical explanation in the framework of self-propelled particle model are reviewed. Noise effects in traffic jam formation on closed loops are also considered and the stability of traffic congestion patterns is discussed. A relation between the follow-the-leader model of traffic flow and the self-propelled particle model is elucidated.