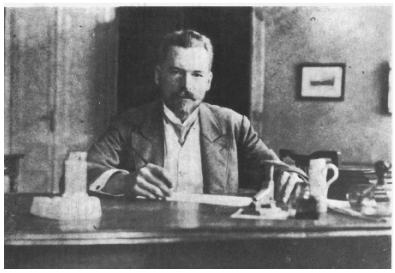

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Active Lèvy matter: Hydrodynamic description and linear stability analysis

Tuesday, September 4, 2018 9:45 AM (20 minutes)

Collective ordered motion can emerge spontaneously in many biological systems, such as bird flocks, insect swarms and tissue under dynamic re-organization. This phenomenon is typically modelled under the active fluid formalism. However, anomalous diffusion, characterizing particles whose position mean-square displacement scales non-linearly in time, is also widespread in biology. For instance, Lèvy walks exhibiting super-diffusion can represent an optimal foraging strategy under specific environmental conditions. Surprisingly, the emergence of collective motion in systems displaying such anomalous diffusive behaviour has not yet been discussed. Here, we will investigate a system of active particles performing Lèvy flights and endowed with alignment interactions. We will derive the model equation in the hydrodynamic limit and investigate the stability of its ordered and disordered phases. This analysis aims at developing a framework integrating both anomalous diffusive motility and inter-particle interactions, thus paving the way for the definition of more realistic active matter models.

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