

Continuous descriptions for dry active matter

Eric BERTIN

We have developed a general method to derive continuous equations for the density and order parameter fields describing the large-scale properties of two-dimensional systems of Vicsek-like active particles, namely overdamped point-like particles with either polar or nematic symmetries. Both the symmetries of motion (self-propelled or diffusive) and of interactions ('ferromagnetic' or nematic) can be varied. From the study of these different cases, a generic scenario emerges in which the (high-noise) homogeneous isotropic phase and the (low-noise) homogeneous ordered phase are separated, in the noise-density plane, by a rather complex non-homogeneous phase dominated by dynamically evolving non-linear structures. Whether this phase exhibits long-range order in the large size limit depends on the specific symmetries considered.

Boltzmann-Ginzburg-Landau approach for continuous descriptions of generic Vicsek-like models

A. Peshkov, E. Bertin, F. Ginelli, H. Chaté, Eur. Phys. J Special Topics **223**, 1315 (2014)

[\[arXiv:1404.3275\]](#).

Large-scale chaos and fluctuations in active nematics

S. Ngo, A. Peshkov, I.S. Aranson, E. Bertin, F. Ginelli, H. Chaté, Phys. Rev. Lett. **113**, 038302

(2014) [\[arXiv:1312.1076\]](#).

Mesoscopic theory for fluctuating active nematics

E. Bertin, H. Chaté, F. Ginelli, S. Mishra, A. Peshkov, S. Ramaswamy, New J. Phys. **15**, 085032

(2013) [\[arXiv:1305.0772\]](#).

Nonlinear field equations for aligning self-propelled rods

A. Peshkov, I. S. Aranson, E. Bertin, H. Chaté, F. Ginelli, Phys. Rev. Lett. **109**, 268701 (2012)

[\[arXiv:1207.5751\]](#).