

Collective Actuation in Polar Active Solids : a Kuramoto-like synchronization?

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概 要

Active matter exhibits rich collective phenomena at large scales, such as new types of phase separation and/or collective directed motion. The past 25 years have seen a surge of experimental observations and theoretical progress in the description of such phenomena in the realm of active liquids. There are however a number of circumstances under which the description in terms of liquids is not suited. One can think of meta-materials made of mechanically connected engines, cohesive cell layers or simply very dense assemblies of self-propelled particles forming a glass or a crystal. In such cases a description in terms of elastic solid is likely to be more appropriate. As of today little is known about the actuation of an elastic lattice by polar active particles, the orientations of which may couple to the displacement field. In the first part of my talk, I will present a new type of collective phenomena, namely collective actuation, which takes place in such polar active solids and discover how the coupling between linear elasticity and activity leads to synchronized chiral oscillation. In the second part of the talk I will discuss the connection of this synchronized dynamics with the celebrated Kuramoto synchronization phenomena.

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