PHYSICAL MATHEMATICS SEMINAR

TAMING ACTIVE MATTER: FROM DANCING DEFECTS TO AUTONOMOUS SHELLS

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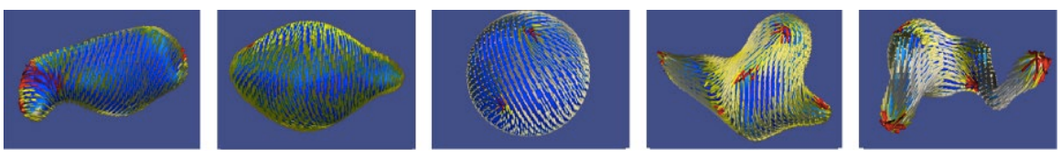
ABSTRACT:

The spontaneous emergence of collective flows is a generic property of active fluids and often leads to chaotic flow patterns characterized by swirls, jets, and topological disclinations in their orientation field. I will first discuss two examples of these collective features helping us understand biological processes:

(i) to explain the *tortoise & hare story in bacterial competition*: how motility of Pseudomonas aeruginosa bacteria leads to a slower invasion of bacteria colonies, which are individually faster, and

(ii) how self-propelled defects lead to finding an unanticipated mechanism for cell death.

I will then discuss various strategies to tame, otherwise chaotic, active flows, showing how hydrodynamic screening of active flows can act as a robust way of controlling and guiding active particles into dynamically ordered coherent structures. I will also explain how combining hydrodynamics with topological constraints can lead to further control of exotic morphologies of active shells.



In-silico design of active self-organizing morphologies

TUESDAY, NOVEMBER 3, 2020
2:30 PM – 3:30 PM

http://math.mit.edu/seminars/pms/

https://mit.zoom.us/j/97273690529
Meeting ID: 972 7369 0529

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