

# PHYSICAL MATHEMATICS SEMINAR

## Dynamics of active nematic defects on cones

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### ABSTRACT:

In the first part of the talk, we investigate the ground-state configurations of two-dimensional liquid crystals with  $p$ -fold rotational symmetry ( $p$ -atics) on cones. The cone apex develops an effective topological charge, which in analogy to electrostatics, leads to defect absorption and emission at the cone apex as the deficit angle of the cone is varied. We find three types of ground-state configurations as a function of cone angle, which is determined by charged defects screening the effective apex charge: (i) for sharp cones, all of the  $+1/p$  defects are absorbed by the apex; (ii) at intermediate cone angles, some of the  $+1/p$  defects are absorbed by the apex and the rest lie equally spaced along a concentric ring on the flank; and (iii) for nearly flat cones, all of the  $+1/p$  defects lie equally spaced along a concentric ring on the flank. We check these results with numerical simulations for a set of commensurate cone angles and find excellent agreement. In the second part of the talk, we investigate the dynamics of an active nematic on a cone, and via simulations find long-time circular orbits of either one or two flank defects, with transitions between these states mediated by the apex via defect absorption, emission, or defect pair creation.

**TUESDAY, APRIL 25, 2023**

**2:30 PM – 3:30 PM**

**MIT - Building 2, Room 449**

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