

PHYSICAL MATHEMATICS SEMINAR

Active nematic material: living liquid crystal

ANDREY SOKOLOV

Argonne National Laboratory

ABSTRACT:

Suspensions of swimming bacteria in water-based liquid crystals present a new class of active matter - living liquid crystals. Anisotropy of the liquid significantly affects the swimming dynamics of bacteria, localize the hydrodynamic flow long a bacterial body and controls the direction of bacterial motion. Swimming bacteria perturb the orientational order of the liquid crystal and lead to the emergence of self-organized complex textures from the initial uniform LLC alignment with a characteristic length controlled by a balance between bacteria activity and anisotropic viscoelasticity of liquid crystal. At high concentration, bacteria can create topological defects of a nematic field. A series of dedicated experiments show that bacteria accumulate in the cores of $+1/2$ defects and avoid $-1/2$ defects. Our findings may suggest a new approach for transport and trapping of motile bacteria and artificial swimmers.

TUESDAY, OCTOBER 24, 2017

2:30 PM

Building 2, Room 142

*Reception following in Building 2, Room 290
(Math Dept. Common Room)*

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