
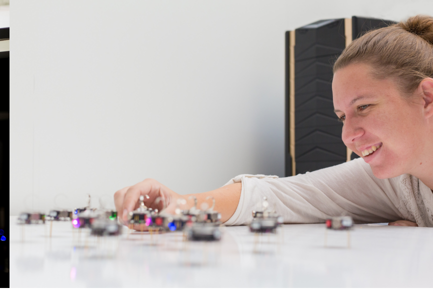


Physics colloquium

Topological Defect Lines and Loops in Liquid Crystals, in and far from Equilibrium

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Date: **2/8/19**
Time: **10:30 AM**
Location: **COB2 170**

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Abstract: Liquid crystallinity, most famous for LC displays, is a widespread phenomenon in synthetic and biological systems. It occurs when a material has order intermediate between that of a simple liquid and that of a crystal. With this partial order comes the possibility of a breakdown of order at topological defects, where distortions are trapped in configurations impossible to “smooth away” locally. In liquid crystals at equilibrium, topological defects present opportunities for self-organized pattern formation and colloidal particle assembly. Here I will discuss the role of topological defects in the dynamics of active matter with liquid crystalline order, such as gels of biofilaments and motor proteins. These are far-from-equilibrium materials in which internally generated forces cause continually morphing distortions, competing with the energetic preference for alignment of the filaments. The geometry and topology of defects are key to understanding the complex dynamics of 3D active liquid crystals: Chaotic self-advection occurs through the spontaneous production of closed-loop singularities in the orientation field.

Bio: Daniel Beller is an assistant professor of physics at the University of California, Merced. His research is in the areas of theoretical and computational soft matter and biological/biomaterial physics. He obtained a Ph.D. in Physics at the University of Pennsylvania in 2014, studying liquid crystals theory. He then did postdoctoral research in soft matter and biological physics at at Harvard University, first in Applied Mathematics as a George F. Carrier Fellow (2014-2016) and subsequently in Physics (2016-2017). Following a second postdoctoral fellowship in the Brown University School of Engineering, he joined the UC Merced Department of Physics in 2018.