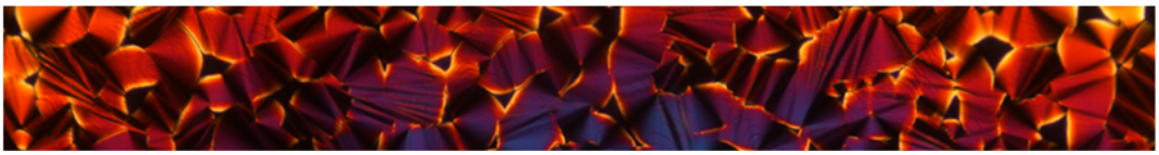

SOFT MATERIALS RESEARCH CENTER

SPECIAL SEMINAR SERIES

Optical imaging, light guiding, and reshaping of chiral and achiral nematic structures with complex topology

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The orientational order-parameter field of frustrated liquid crystals is characterized by stable or metastable defects ranging from singular points and disclinations to nonsingular solitons. Frustration in such topological soft matter comes from conflicting effects of confining geometries, surface coupling, chirality, liquid crystalline elasticity, and external fields. The synergy of experiments and numerical modeling implemented by combining the data from classical, confocal, and fluorescent polarization microscopies with modeling and optical image simulations is essential to unveil complex nematic ordering. Here I will focus to two of our relatively recent efforts: First I will show how including focusing in simulations of polarization microscopy [1] can help to uncover more details of complex structures in chiral nematic droplets. In the second example I will focus on the light control by complex nematic structures and on the control of complex structures by light [2]. We use an optimized FDTD simulation method for the description of the light propagation in complex LC structures. Further by coupling it with a Q-tensor based structure simulation we describe the back effect of light on nematic ordering, what is particularly relevant at high light intensities. The approach will be illustrated by a simulation of high intensity light propagation along a solitonic defect structure.

1. U. Mur, S. Čopar, G. Posnjak, I. Muševič, M. Ravnik and S. Žumer, Ray optics simulations of polarized microscopy textures in chiral nematic droplets, Liq. Cryst. 44, 679 (2017).
2. M. Čančula, M. Ravnik, I. Muševič and S. Žumer, Liquid microlenses and waveguides from bulk nematic birefringent profiles, Opt. Express 24, 22177 (2016).

Monday, March 12th at 12 p.m. in Duane Physics G126

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