



# PHYSICS COLLOQUIUM:

## Liquid crystal topological defects across phases and materials

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**Date:**

4/16/2021

**Time:**

10:30 AM-11:50 AM

**Link:**

Please contact  
snsgradstaff@ucmerced.edu  
for the Zoom link and  
passcode.

**About The Speaker:**

Francesca Serra is an experimental physicist working on liquid crystals. She got her PhD at the University of Cambridge, where she studied photo-sensitive liquid crystals and liquid crystal elastomers. In her postdoctoral research at the University of Milan and at the University of Pennsylvania, she began her work on topological defects and colloidal assembly in liquid crystals. Since 2017 she has been an assistant professor at Johns Hopkins University, where her group studies the use of topological defects for optics and the analogy between liquid crystals and living cells.

**Abstract:**

The term “liquid crystals” identifies a range of phases of matter characterized by varying degrees of orientational and positional order. In these ordered fluids, the regions of local disorder called topological defects are interesting for their optical properties and for having high elastic energy. There are various strategies to control topological defects in liquid crystals, from substrate topography to external fields. I will discuss another “knob” to manipulate defects, that is, the transition between different liquid crystalline phases. In particular, I will show two unusual defect behaviors observed at the transition between the smectic and the nematic liquid crystals phase.

The long-range order that characterizes liquid crystals, however, is present not only in molecular liquid crystals, but also in the assembly of larger objects, such as nanorods or even layers of cells. Topological defects associated with such order are therefore also present in all these systems. In this context, I will discuss the topological defects that form in monolayers of fibroblasts and epithelial cells guided by micro-ridges and how liquid crystals can help our understanding of cells’ organization.

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