

F-5 SEMINAR



CONDENSED MATTER PHYSICS

*Thursday, February 1, 2024
at 11:30 AM*

*in the seminar room of physics (room 106)
Condensed Matter Physics, Jožef Stefan Institute*

Prof. Jonathan Selinger

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Director Deformations, Geometric Frustration, and Modulated Phases in Liquid Crystals

In this talk, we analyze modulated phases in liquid crystals, from the long-established cholesteric and blue phases to the recently discovered twist-bend, splay-bend, and splay nematic phases, as well as the twist-grain-boundary (TGB) and helical nanofilament variations on smectic phases. The analysis uses the concept of four fundamental modes of director deformation: twist, bend, splay, and a fourth mode related to saddle-splay. Each mode is coupled to a specific type of molecular order: chirality, polarization perpendicular and parallel to the director, and octupolar order. When the liquid crystal develops one type of spontaneous order, the ideal local structure becomes nonuniform, with the corresponding director deformation. In general, the ideal local structure is frustrated; it cannot fill space. As a result, the liquid crystal must form a complex global phase, which may have a combination of deformation modes, and may have a periodic array of defects. Thus, the concept of an ideal local structure under geometric frustration provides a unified framework to understand the wide variety of modulated phases.

You are cordially invited to attend.