

F-5 SEMINAR



CONDENSED MATTER PHYSICS

*Friday, October 13, 2023
at 10:30 AM*

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

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Towards the estimation of effective elastic properties of liquid crystal blue phases

Blue phases (BPs) are unique types of liquid crystal which form structures with crystal (cubic) symmetry. They are highly self-assembled mesoscopic structures which can occur between the cholesteric phase and the isotropic (liquid) phase. BPs are typically stable only over a narrow temperature range, but structural modifications have been made which extend their temperature stability ranges considerably. This revived interest in blue phase research, in part because of the possible applications. It is expected that a significant role of the elastic properties may arise in such modified BP. In particular, the elasticity of BPs influences the Kerr constant which is a key factor in lowering the operating switching voltage. BP samples are however extremely soft polycrystalline material which makes the experimental determination of the elastic constants very difficult in practice.

The elastic contribution is involved in the Gerber formula which relates the Kerr constant of BP to dielectric anisotropy, the birefringence and the average elastic constant of the nematic liquid crystal hosts. These 'parameters' are mostly unknown for BPs and data obtained for the corresponding cholesteric phase is commonly used. In this presentation we consider the modified Gerber model. In the modified model the Kerr constant and the parameters obtained for the BPs are exploited. The corresponding experimental results for BP samples are presented and discussed. This approach tests the role of effective birefringence and lattice spacing and makes feasible the estimation of the effective contribution of the elastic part of BP samples.

You are cordially invited to attend.