

University of Notre Dame
College of Science
Department of Physics

CONDENSED MATTER SEMINAR

Colloidal blue phases

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In this seminar I will first introduce blue phases and then concentrate to our study of dispersed colloidal particles. These are unique fluidic systems that can occur in a narrow temperature range between the isotropic and simple cholesteric phases of highly chiral nematogenic materials. A competition of intrinsic tendencies to exhibit simple nematic ordering and to form double twisted deformations yields complex 3D director patterns and disclination networks. The blue phases I & II exhibit cubic orientational ordering (space groups O_8 and O_2) with lattice constants of several hundred nanometers. Recent developments that led to the blue phases with extended stability range make them more attractive for optical and photonic applications.

In our study the use of intrinsic defect networks as trapping sites to self-assemble colloidal particles in 3D photonic crystals is examined. The phenomenological description combined with elements of topological theory, that was proven to be extremely fruitful in explaining and predicting nematic colloidal structures, is used to predict particle assemblies and blue phase stability. We analyze effects of particle properties and sizes ranging from micron to nanometre scale. Colloidal crystals formed in such assembling can be easily manipulated by external stimuli via affecting the liquid crystal matrix or colloidal particles and thus open possibilities for applications.

Host: Gregory Crawford

ALL INTERESTED PERSONS ARE CORDIALLY INVITED TO ATTEND