

## **Optical structuring of matter for all-optical applications**

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This lecture will introduce the optical realignment effects and then will describe the laser-induced two-dimensional periodic photonic structures formed by localized particle-like excitations in an untwisted confined cholesteric liquid crystal. The particle-like excitations dubbed Torons contain three-dimensional twist of the liquid crystal director matched to the uniform background director field by topological point defects. Using both single-beam-steering and holographic generation approaches, the periodic crystal lattices are tailored by tuning their periodicity, reorienting their crystallographic axes, introducing defects, etc. Moreover, these lattices can be dynamically generated, modified, erased and then recreated, depending on the need of photonic applications. This robust control is performed by tightly-focused laser beams of power 10-100mW and by low-frequency electric fields at voltages  $\sim 10V$  applied to cell electrodes.