

Nanoscale Physics

The Twist Bend Nematic Liquid Crystals Structure

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Chirality is one of the most fascinating phenomenon that can be present in complex systems. It is especially interesting in liquid crystals, which already attract great attention due to their unusual optical properties. The most known liquid crystal chiral phases are cholesterics and blue phases. Both these systems, however, are built from molecules which exhibit molecular chirality, hence it is no surprise that their macroscopic phase may exhibit global chirality. Existence of chiral phases in the systems composed of achiral molecules is more elusive and puzzling. An example of such a phase is recently discovered the nematic twist-bend phase (NTB). In the standard nematic phase all the molecules tend to orient onto one direction which is described by a vector called the director. In the NTB phase this vector is not constant in space but follows a heliconical structure whose pitch is comparable with molecular dimensions. In contrast to cholesterics, where the director is positioned perpendicularly to the spiral axis, in the NTB phase the director is tilted. In the current presentation we would like to discuss the elements of the Landau theory of the NTB phase and the obtained numerical results.

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