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Theoretical Models for the Nematic Twist-Bend Phase and the seminal contribution of Prof. Longa

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The discovery of the twist-bend nematic phase (NTB) can be considered as one of the most significant recent achivements in the field of liquid crystals. In the NTB phase the director is tilted at constant angle θ and forms a heliconical structure with nanoscale pitch which appears despite the achiral structure of the constituent molecules. From the general soft matter point of view the NTB phase can be considered as the first example of spontaneous chiral symmetry breaking in a fluid.

We discuss the existing Landau-de Gennes theory of the nematic twist-bend phase as well as the corresponding molecular models with the special emphasis on the contribution made by Lech Longa.
In particular we consider the stabilization of the twist-bend structure, the role of the flexoelectric effect and the softening of the bend elastic constant, and the role of the local biaxial ordering.

References:

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Primary author: Prof. OSIPOV, Mikhail (University of Strathclyde)

Presenter: Prof. OSIPOV, Mikhail (University of Strathclyde)

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