Coherent backscattering of light in ordered nematic liquid crystals

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The effect of coherent backscattering on the director fluctuations in the ordered phase of nematic liquid crystals is investigated. The orientation of the director is specified by an external magnetic field. The effect of coherent backscattering manifests itself in the existence of a sharp peak in intensity of the light scattered in the backward direction. Starting from the Bethe-Salpeter equation we calculate the multiple scattering intensity taking into account the ladder and maximally crossed diagrams. In the framework of the diffusion approximation (1) we obtain the analytical expression for the angular and polarization dependences of the coherent backscattering intensity. We perform the comparison of our calculations with the experiment (2). It is shown that the theory describes the angular anisotropy and elliptical form of the backscattering cone for the incident and scattered extraordinary beams (Figure 1). Also we show that there is no coherent input in case of crossed polarizations of incident and scattered light.

References

(1) H. Stark, T. C. Lubensky *Phys. Rev. E* **1997**, *55,* 514
(2) R. Sapienza, D. S. Wiersma, D. Delande *Mol. Cryst. Liq. Cryst.* **2005**, *429,* 193

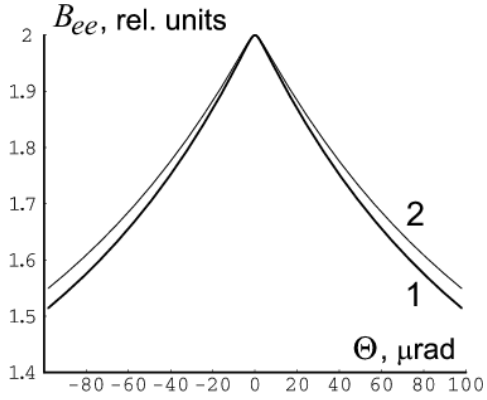

Figure 1. Coherent backscattering from the ordered nematic liquid crystal for orthogonal scanning directions: 1 – along the director, 2 – across the director.