UNIVERSALITY OF ORIENTATIONAL QUENCHED DISORDER INA NEMATIC LIQUID CRYSTAL

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Quenched disorder (QD) defines a frozen disorder with a peculiar statistical signature. Experimental evidence of QD has been found in different systems of condensed matter where the influence of surfaces plays a relevant role. In particular, in liquid crystals (LCs), QD affects the phase behaviour of nematic elastomers [1] and explains the observed glassy behaviour when a LC is embedded in porous matrices with high surface/volume ratio [2].

In this paper, we study the effect of different anchoring substrates on the orientational QD of a nematic liquid crystal.

In the experimental setup planar anchoring layers under study are assembled with a homeotropic counter plate. Then the cell is filled with a nematic liquid crystal and kept in an oven in a polarizing microscope equipped with a high resolution CCD camera. By rotating the crossed polarizers, the transmitted intensity profile is obtained for every pixel of CCD. This array of profiles gives spatial maps of azimuthal angle, zenithal angle and azimuth anchoring energy. The QD is then characterized via analyses of the spatial correlations of these maps.

All measured substrates (SiO, PVCN-F, PI, bare ITO) with the exception of mica show orientational QD. The universality of this behaviour for non crystalline substrate is discussed. The role of the memory effect and its dependence on the sample thermal history in intrinsically isotropic layer (not irradiated PVCN-F and bare ITO) will be also addressed.

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[2] M. Rotunno, M. Buscaglia, C. Chiccoli, F. Mantegazza, P. Pasini, T. Bellini, and C. Zannoni, *Phys. Rev. Lett.*, 94, 097802 (2005).