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Evidence of Broken Reciprocity in Cholesteric Liquid Crystals

NITHYA VENKATARAMAN, MICHELE MOREIRA, BAHMAN TAHERI, PETER PALFFY-MUHORAY, Liquid Crystal Institute, KSU, LIQUID CRYSTAL INSTITUTE TEAM — Reciprocity of scattering of a plane incident wave is predicated on bounded scattering media with symmetric and linear permittivity, conductivity and permeability. In chiral media, such as cholesteric liquid crystals, the dielectric tensor is asymmetric due the presence of odd powers of the wave vector resulting from nonlocality and broken inversion symmetry. Evidence of non-reciprocity has been found in optically active crystals by Bennet [1] and in stacks of cholesteric and nematic liquid crystal cells [2]. Here we present transmittance and reflectance data for cholesteric cells with different pitches having overlapping but distinct reflection bands. We relate our results to simple analytic descriptions of the materials properties and of propagating modes and assess them in light of the requirements for reciprocity. 1. P.J. Bennett, S. Dhanjal, Yu. P. Svirko and N. I. Zheludev, *Opt. Lett.* **21**, 1955 (1996) 2. J. Hwang; M.H. Song; B. Park; S. Nishimura; T. Toyooka; J.W. Wu; Y. Takanishi; K. Ishikawa; H. Takezoe, *Nat. Mat.* **4**, 383 (2005).

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