



量子物理学・ナノサイエンス第 220 回セミナー

Macroscopic properties of ferromagnetic nematics

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日程 : **3月19日(月) 16:30-18:00**

場所 : **本館1階 H155B 理学院セミナー室**

概要

Already more than 4 decades ago the possibility of ferromagnetic nematic liquid crystals has been postulated [1] by combining ferromagnetic nanoparticles with a nematic solvent. First experiments along these ideas were carried out immediately [2], giving rise to ferronematics with no spontaneous magnetization. Only a few years ago [3], with the development of suitably well-characterized magnetic nanoparticles, truly ferromagnetic nematics could be synthesized and analyzed thus establishing the first room temperature multiferroic liquid system. The static properties including magneto-optic and converse magnetoelectric effects were demonstrated [4]. Quite recently the study of the dynamics of truly ferromagnetic nematic liquid crystals properties has started [5]. It was demonstrated in [5] that a dissipative cross-coupling between the two order parameters [6], magnetization and director, is essential to account for the dynamic experimental results quantitatively. Recent developments [7,8] in the dynamic domain include investigations of the light scattering behavior as well as the coupling to flow including shear flows and the analog of the Miesowicz viscosities familiar from usual nematic liquid crystals.

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[5] T. Potisk et al., *Phys. Rev. Lett.* **119**, 097802 (2017).

[6] E. Jarkova, H. Pleiner, H.-W. Mueller and H.R. Brand, *J. Chem. Phys.* **118**, 2422 (2003).

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