量子物理学・ナノサイエンス第 205 回セミナー

Electrically Controlled Dynamics of Knotted Director Fields and Defects in Liquid Crystals

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場所　：　本館 2 階　H239　物理学系輪講室

概　要

Active colloids and liquid crystals are capable of locally converting the macroscopically-supplied energy into directional motion and promise a host of new applications, ranging from drug delivery to cargo transport at the mesoscale. In this presentation, I will discuss how knotted fields and defects in liquid crystals can locally transform electric energy to translational motion and allow for the transport of cargo along directions dependent on frequency of the applied electric field. By combining polarized optical video microscopy and numerical modeling that reproduces both the equilibrium structures of solitons and their temporal evolution in applied fields, we uncover the physical underpinnings behind this reconfigurable motion and study how it depends on the structure and topology of defects. In my lecture I will show that, unexpectedly, the directional motion of the studied defects with and without the cargo arises mainly from the asymmetry in rotational dynamics of molecular ordering in liquid crystal, rather than from the asymmetry of fluid flows, as in conventional active soft matter systems.

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