TECHNISCHE UNIVERSITÄT WIEN

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EINLADUNG zum IFP-SEMINAR

Optically controlled wave guidance with liquid crystals

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Host:	Evan Constable
Termin:	Mittwoch, 03.07.2024, 16:00 Uhr
Ort:	TU Wien, Freihausgebäude Wiedner Hauptstraße 8-10, 1040 Wien Seminarraum DC rot 07 (roter Bereich, 7. OG)

Abstract:

Liquid crystals (LC) gained their fame and acquired ubiquity in modern optoelectronic and photonic technologies due to their large birefringence and strong responsiveness to external fields.
A short introduction to the history and basics of liquid crystals will be followed with the comparison of the two fundamentally distinct nonlinear optical mechanisms peculiar of the LC medium – orientational nonlinearity, i.e. reorientation of the LC director, and the LC order parameter modulation. Because of the presence of elastic forces, the former reveals nonlocality of response that hampers its reliability if a strict one-to-one correspondence between the light intensity and refractive index modulation is required. The second mechanism, described with the model of Light-Induced Order Modification (LIOM) accounts for the changes of the refractive indices of an LC layer resulted from the photo-induced changes of the LC molecular ordering.
The LIOM-type mechanism does not depend on the cell thickness and furnishes really fine resolution. It works for the whole range of light wavelengths and runs by far faster than the LC director reorientation. Moreover, since the optical read-out is spectrally independent from the pumping, such a mechanism could be useful for fast control of optical signals of very high intensity, for instance, in the IR range and beyond.
Despite being strictly local in material response LIOM-mechanisms nevertheless imply fine tuning of the phase shift between an interference pattern and recorded refractive index grating. Such a photorefractive-like nonlocality could be used in phase conjugation, beam steering, creation of phase delay lines or pulse shaping, etc. There are expectations, at least.