Date: Friday, 16 June 2023, 11:15 h

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Title: Quadratic and cubic magneto-optic Kerr effect in magnetic thin films

Abstract:
The magneto-optic Kerr effect (MOKE) describes the change of polarization state upon reflection of polarized light from a magnetized sample [1]. Initially this effect has been assumed to be proportional to the magnetization $M$ of the investigated sample and, thus, became a standard tool to study magnetic thin-film systems [2]. However, in the last two decades contributions of second order in $M$ have been explored [3]. The so-called quadratic MOKE (QMOKE) is proportional to $M^2$ and is, e.g., utilized to study antiferromagnetic materials [4] since the MOKE linear in $M$ (LinMOKE) vanishes here.

In my talk, I will introduce higher-order MOKE effects and discuss recent examples. We have investigated the QMOKE in Fe [5] and Heusler compound thin films [6], and confirmed the linear dependence of the QMOKE on the structural order of the Heusler compound in a wide spectral range. Furthermore, we explored the third-order MOKE called cubic MOKE (CMOKE) being proportional to $M^3$ in Ni(111) thin films [7]. We found a strong dependence of the CMOKE on the structural domain twinning of the Ni thin films characterized by off-specular x-ray diffraction mappings. Thus, this effect could be of future use in MOKE microscopy and time-resolved MOKE to determine the creation and manipulation of structural domain twins in space and time.

References