

Magneto-optics

Rudolf Schäfer

IFW Dresden, Germany

* r.schaefer@ifw-dresden.de

Magneto-optics describes the influence of magnetic fields or of a spontaneous magnetization on the emission or propagation of light in matter. This presentation will cover the basics of magneto-optics at visible frequencies and its application for domain imaging and magnetometry. For magneto-optics at shorter, X-ray frequencies we refer to the presentation of Jan Lüning.

Lecture topics:

1. Magneto-optical effects
 - a. Physical basics
 - a. Faraday effect
 - b. Kerr effect
 - c. Voigt effect
 - d. Gradient effect
2. Application of magneto-optical effects
 - a. Domain imaging
 - b. Magnetometry
3. Recent developments of magnetic domain imaging by wide-field magneto-optical microscopy
 - a. Selective sensitivity
 - b. Depth sensitive domain imaging
 - c. Time-resolved domain imaging
 - d. Deconvolution techniques for lateral resolution enhancement
 - e. Vector magnetometry and quantitative Kerr microscopy
 - f. Magneto-optic indicator films (MOIF)

Recommended reading:

- [1] W. Kuch, R. Schäfer, P. Fischer, and F.U. Hillebrecht, *Magnetic Microscopy of Layered Structures* (Springer, 2015), chapter 2
- [2] R. Schäfer, *Investigation of domains and dynamics of domain walls by the magneto-optical Kerr-effect*, in: H. Kronmüller, S. Parkin (Eds.), *Handbook of Magnetism and Advanced Magnetic Materials*, (John Wiley & Sons 2007)
- [3] J. McCord, *Progress in magnetic domain observation by advanced magneto-optical microscopy*, *J. Phys. D: Appl. Phys.* **48** 333001 (2015)