INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	Irradiated Solids Laboratory (LSI), Ecole Polytechnique
Website of the Host Laboratory	https://portail.polytechnique.edu/lsi/en/
Research Group	Physics and chemistry of nano-objects
Internship Supervisor	Vasily Temnov
Internship Subject	Linear and nonlinear magneto-photonics
Student's level	X Advanced Undergraduate Students (3rd or 4th year) X Master's students (1st or 2nd year) X PhD students
Proposed Duration	☐ 3 months X 4 months X 5 months X 6 months
Prerequisites	Basic knowledge in solid state physics, magnetism and/or nonlinear optics
Internship description (max. 15 lines)	The core part this internship will be focused on the linear magneto-photonics in complex magnetic nanostructures using scanning magneto-optical microscopy. The present implementation of the Kerr microscope is based on the combination of the *transverse* magneto-optical Kerr effect [1] with the scanning nano-optical setup under the action of kHz-frequency oscillating magnetic fields [2]. The structures of interest are poorly understood magnetic nanostructures produced by pulsed laser irradiation of ferromagnetic thin films [3]. In the first part of internship the student will be asked to extend the scanning Kerr microscopy to the *longitudinal* and/or *polar* configurations (including the in-depth analysis of magnetic hysteresis loops). For longer internships, the new exploratory part of this research line will deal with the possibility to magnetically control the non-linear optical phenomena induced by single high-intensity femtosecond laser pulses in bulk dielectrics [4]. [1] https://en.wikipedia.org/wiki/Magneto-optic_Kerr_effect [2] V. Temnov et al., Nature Phot. 4, 107 (2010). [3] V. Temnov et al., Nanolett. 20, 7912 (2020). [4] Y. R. Shen, The Principles of Nonlinear Optics, Wiley (2002).

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