Aalto University

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Manipulating light with nanomagnets and vice versa

Title of the dissertation	Loss circumvention and plasmonic lasing in arrays of magnetic nanodots
Contents of the dissertation	Nowadays nanotechnology has a leading role in our modern society. The development of nanoelectronics has transformed bulky mobile phones into compact devices that offer nearly the same capabilities as a basic computer. While nanoelectronics works well for generating and processing information, communication is still based on micrometer size components at best. The development of technologies purely based on the interaction of light and nanoscale objects is still at an early stage. The study of light-matter interactions at the nanoscale constitutes the core of this dissertation work. In particular, this dissertation focuses on the interaction of light and nanomagnets. Magnetic materials introduce a way to externally manipulate fundamental properties of light by means of an applied magnetic field. These magneto-optical effects can be strongly enhanced when the size and shape of the nanomagnets are properly engineered. This work provides basic guidelines to attained such magneto-optical enhancements as well as two new applications: All-optical manipulation of the magnetic properties of nanomagnets and magnetic-field control of the intensity of a plasmonic laser. These applications could enable the development of ultrafast magnetic storage memories and a wireless way to control the intensity of a nanoscale laser.
Field of the dissertation	Magnetoplasmonics
Doctoral candidate	Francisco Freire Fernández, M.Sc.
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