



Spin-orbit Interactions and Topology of Electromagnetic Fields

Date & Time: May 5, 2021 (Wednesday) 5:00 p.m.

Zoom Online Lecture: <https://bit.ly/2QfEfRa>

Meeting ID: 924 8438 3141 Password: 2859



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Abstract:

Photonic spin-orbit interactions are responsible for coupling of spin angular momentum of light, associated with circular polarisation of an electromagnetic wave, to orbital angular momentum, associated with the energy flow and propagation direction. Being strongly enhanced in a nanostructured environment, spin-orbit coupling provides interesting and important applications in polarisation-enabled control of optical signals, or in reverse, controlling light polarisation, optical forces, sensing applications and quantum optical processes. Near nanostructures capable of supporting waveguided modes, the spin-orbit coupling is mediated by the transverse spin carried by evanescent waves: electric field spins around an axis perpendicular to the wavevector, with the spinning sense determined solely by the propagation direction. The spin-orbit coupling in such type of modes, results in the so-called photonic spin-Hall effect, in analogy to spin-Hall effect for electrons.

In this talk we will overview the effects associated with the photon spin and angular orbital momenta when light beams interact with plasmonic nanostructures and metamaterials. Various unusual dipolar sources which either are forbidden to excite waveguiding modes or allow complete freedom in tailoring excitation of multiple waveguided modes with a single dipolar source will be reviewed. Spin coupling to orbital angular momentum in complex beams will also be discussed, resulting in deep-subwavelength features of the resulting photonic textures, termed photonic skyrmions. Photonic spin-orbit interactions provide an important tool for harvesting new functionalities and applications of polarised light in numerous photonic and quantum technologies and metrology.

Biography:

Professor Anatoly V. Zayats is a Chair in Experimental Physics and the head of the Photonics and Nanotechnology at the Department of Physics, King's College London, where he also leads Nano-optics and Near-field Spectroscopy Laboratory (www.nano-optics.org.uk). He is a Co-Director of the London Centre for Nanotechnology and the London Institute of Advanced Light Technologies. His current research interests are in the areas of nanophotonics, plasmonics, metamaterials, optical spin-orbit coupling, scanning probe microscopy, nonlinear and ultrafast optics and spectroscopy, and optical properties of surfaces, thin films, semiconductors and low-dimensional structures. He is a founding co-editor-in-chief of Advanced Photonics. He is a Fellow of the Institute of Physics, the Optical Society of America, SPIE and the Royal Society of Chemistry.

Anyone interested is welcome to attend!

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