Global Initiative for Academic Networks (GIAN)

Under the aegis of MHRD

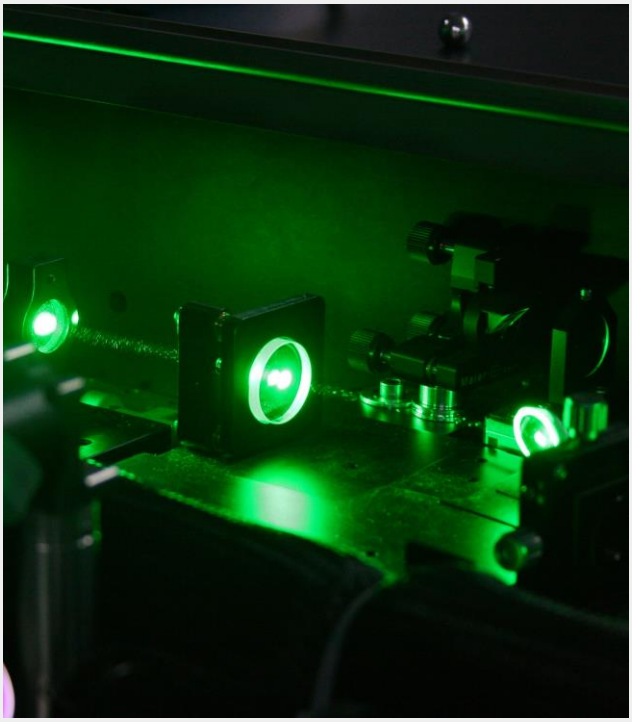
Structured Light-Matter Interaction and its Applications

March 9 - 19 March 2020 at IISER Mohali

Overview

Nowadays, light is at the heart of our modern technologies to observe, understand and manipulate Nature, while our information network strongly relies on optical communication links. Light is much more than a way to enlighten a scene or providing some energy around. Indeed, many technological developments have and continue to be made by exploiting the linear and angular momenta of optical fields.

It's known since more than one century that light may carry spin angular momentum associated with its polarization degree of freedom and since then another source of angular momentum emerged and bloomed during the last two decades. Indeed, light field can also carry orbital angular momentum associated with the spatial degrees of freedom. More specifically, light beams carrying phase singularities possess a nonzero azimuthal energy flow and are known as optical vortices. Such vortex beams carry non-zero orbital angular momentum and promise many applications, which include micromanipulation, microscopy, quantum information, or astronomical imaging.



Optical vortices have already started to revolutionize our way to tame light from atomic to macroscopic scales. Interestingly, the polarization and the spatial structure of a light beam may dependent one from each other, which refers to optical spin-orbit interaction. Though being a subtle effect, spin-orbit interaction of light occurs in scattering, diffraction, focusing and propagation of electromagnetic waves and its study has become an intense research field in optics and photonics in the recent years, and fundamental phenomena have already become commercial applications. The proposed set of lectures and tutorials aim at covering recent developments in the field of structured light-matter interaction with a focus on a particular kind of prime choice optical materials, liquid crystals.

Objective

★ To expose the participants to new emerging frontier on generation, formalism and applications of structure carrying spin and angular momentum.

★ Strengthening the theoretical concepts by classroom demonstration in manipulating light using table-top setups.

★ To introduce the advance photonic devices exploiting properties of structured light.

★ To build a solid foundation of the properties of light using liquid crystals as ideal test bed for interaction of matter with structured light.

Faculties

Prof. Etienne Brasselet
University of Bordeaux, France

Dr. Kamal P. Singh
IISER Mohali, India

Topics

- ➔ Liquid crystals: Structure/electro/optical properties.
- ➔ Linear and angular momenta of light and their effect on matter.
- ➔ Spin orbital interaction of light and its effect on matter.
- ➔ Self-engineered spin-photonics devices.
- ➔ Discriminatory opto-mechanics of chiral systems.
- ➔ Future perspectives of structured light-matter interaction and applications.

Who should apply

- ❑ Final year Integrated BS-MS, B. Tech, M. Sc, M. Tech or equivalents.
- ❑ PhD students and Postdoctoral scholars.
- ❑ Young faculties and researchers from academic Institutions, technical Institutions and companies.

Fees**

❑ Foreign Participation	USD 100
❑ Faculties and Companies	INR 3000
❑ Postdocs and PhD	INR 2000
❑ UG/PG students	INR 1500

** Accommodation may be provided on prior request and subjected to availability on separate payment basis.
** The fee includes only academic materials.

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