

Master 2 “Photonics, Complex and Quantum Systems (PhoCQS)”: Research Training 2023-2024

Supervisor: Sivankutty Siddharth

Topic: Photonics

Photonic lanterns for wavefront sensing and imaging.

Photonic lanterns are powerful tools for manipulating and guiding light in various applications, ranging from astronomy, telecommunications and imaging. Typically, photonic lanterns are engineered to be spatial mode multiplexers. In a new approach, we seek to exploit the sensitivity of the photonic lanterns to the complex electric field at its input to realize highly miniaturized wavefront sensors and imagers. During the internship, we will seek to estimate complex electric fields with a minimum number of measurements. This will be achieved by using compressive sensing techniques and compared to digital holographic techniques. The internship will involve hands-on optical labwork such as i) fabrication and characterization of the photonic lanterns optimized for wavefront sensing applications and ii) experimental evaluation of the device and the comparison of its performance over several regimes of operation.

Key words: wavefront sensors, imaging, compressive sensing, fiber devices, electric field reconstruction.