

## PhD Thesis Project

### **Four-Wave Mixing with vortex beams**

The optical properties of nanoobjects and nanostructures are a growing research subject. However, performing nonlinear (NL) spectroscopy or time-resolved (TR) spectroscopy experiments at the microscopic scale that goes beyond the sample spatial inhomogeneities, remains a challenge. Among NL processes, Four-Wave Mixing (FWM) is a very versatile method, used in TR experiments in condensed matter as well as in NL spectroscopy in vapors. The usual FWM experimental configuration needs to distinguish the exciting and emitted beams by their propagation direction. This is not compatible with focusing on small spatial scale that needs large numerical aperture. The use of Laguerre-Gauss (LG) beams allows overpassing this constraint by discriminating the beams with their orbital angular momentum (OAM). The team “Ultrafast dynamics of nanostructures and nano-objects” at the Institute of physics and chemistry of materials in Strasbourg, in collaboration with the team “Cold Rubidium and twisted light” at Laboratoire Aimé Cotton at Orsay, aim at studying FWM processes with LG beams in various configurations and on different types of materials at the microscopic scale, in order to explore the opportunities offered by new setups that will use FWM with LG modes.

In this context, the Ultrafast Optics and Nanophotonics group of the IPCMS in Strasbourg is seeking a PhD candidate. The position will be open from October 2018, and has a 3-years duration. This collaborative project, funded by Labex NIE, involves partners in Strasbourg and Paris-Sud Universities. We seek for an excellent student with a Master degree in Physics and good ability to teamwork. Applications including a CV and a letter of recommendation must be sent to:

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