Master thesis proposal

LPL, 99 avenue Jean-Baptiste Clément, 93430 Villetaneuse
Directrice: Anne Amy-Klein

Title: Fundamental limitations of frequency dissemination due to polarization effects

Keywords: metrology, REFIMEVE, optical link, laser, frequency dissemination, polarisation

Scientific description:

Optical fiber links were developed in the last decade to transfer an ultrastable frequency reference over hundreds of km, with a minimal degradation of its stability and accuracy performance. It consists of transmitting an ultrastable laser, which frequency is controlled with atomic clocks, through an optical fiber to the remote lab, with an active compensation of the propagation phase noise.
In France REFIMEVE is a national network of optical links which is developed and operated by LPL and LTE laboratories. It also has connections to UK, Germany and Italy for clocks comparisons and tests of fundamental physics beyond the standard model. See https://www.refimeve.fr/
We are currently studying the impact of polarisation effects both on the performance of the transfer through the fiber link and on the sensitivity of links to seismic vibrations and temperature variations. The intern will contribute to this study with an experiment which enables the propagation of orthogonal polarisation in fiber spools, and analyse the effects of length, temperature and vibrations.

Environment : The LPL laboratory is a physics laboratory focussed on laser development and light matter interaction experiments, carrying both fundamental and applied experiments.
The lab is located in the USPN campus, easily accessible from the north of Paris : only 12 mins from Gare du Nord to Epinay-Villetaneuse using line H of transilien (included in Navigo), and connected to trams 11 and 8 and buses
Techniques/methods in use: fiber optics, optoelectronics, frequency measurements
Applicant skills: Optics – Basis in electronics – Modelisation and data analysis
Industrial partnership: No

Internship supervisor: Adèle Hilico adele.hilico@univ-paris13.fr
Internship location: Laboratoire de Physique des Lasers, Villetaneuse

Possibility for a Doctoral thesis: Yes but not yet financed