Project number	**MSCA-ITN-2014-ETN 641272**
Project title	**High-intensity coherent nonlinear optics (HICONO)**
Title	**Fellow's report on activities :** **Supervision of preparatory class students during internships ("Tutored personal work" program)** **(Oct. 2016 – June 2016)**
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Goal : Students of the preparatory classes for the French "Grandes Ecoles" have to present for their competitive exams the output of an experimental personal work in physics, e.g. performed during internships in companies. Via the "Tutored Personal Work" (acronym TIPE in French) we have access to these students to raise their interest for HICONO-related research.

Impact : We had two groups of two students from the Lycée Masséna (Nice, France) working on their Tutored Personal Work at FTL.

Methodology : From M12 to M20 (October 2016 to June 2017), I supervised the students at HICONO-related projects at FTL. The topic was the application of spectral interferometry to the measurement of distances and thicknesses. The first few hours of this tutorship were spent to explain what a laser is, then what a femtosecond laser is. Then I presented how to use nonlinear optics to modify some of the parameters of the laser: starting from an infrared laser (1030 nm, 1 mJ, 1 kHz, <500 fs) it is possible to generate white-light by focusing few µJ of light in a YAG crystal. I then explained what Mach-Zender interferometer is and detailed its applications in the scientific world. After these theoretical explanations, the students entered in the laboratory. I then explained the security rules and how to behave in a laboratory.

The students have learned how to choose the correct mirrors and lenses depending on the characteristics of the laser and how handle the beams. They understood the importance of elements such as a polarizers and the half-wave plates to optimize the level of energy required to create non-linear effects. The Mach-Zehnder interferometer was then assembled. The students measured the effect of a movable mirror on the interference spectrum and inserted various glass windows in one the two arms. I showed then how to acquire the data from a visible spectrometer for different

positions and with/without the glass windows. Finally, they calculated the refractive index of the glass knowing the refractive index.

For the students, it was a very positive experience: first time in an optical laboratory, first laser. In addition, the calculation of the thickness of the glass has also been useful for reviewing some of the basic laws of optics. From my point of view the experience was totally new and very fun, for the first time I had to present and explain my field of work and research. I had to prepare small optics lessons and also, I had to check that their work in the lab was going in the right way.