

MASTER IN PHOTONICS – PHOTONICS BCN EUROPHOTONICS-POESII MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Dates: April - September 2017

Laboratory : Dynamics, Nonlinear Optics and Lasers
Institution: Universitat Politècnica de Catalunya (UPC)
City, Country : Terrassa, Spain

Title of the master thesis: Generation of ultra-high optical pulses on demand

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Summary of the subject:

Optical rogue waves are ultra-high, rare, and unpredictable intensity pulses that are generated by laser systems under particular conditions. Understanding the mechanisms responsible for the generation of such extreme pulses is an important challenge that is receiving a great deal of attention. The goal of this Master Thesis is to perform simulations of a laser model in order to determine the conditions that allow generating these pulses on demand. By including in the model a periodic perturbation, the goal will be to analyse which characteristics of the perturbation (amplitude, frequency, shape) produce a regular sequence of ultra-high pulses.

Keywords : ultra-high pulses, optical rogue waves, semiconductor lasers, optical injection, periodic perturbation

Additional information :

- * Required skills : the student will need to have good computer skills (matlab, or C or python)
- * Miscellaneous : the proposed work is mainly theoretical but if the student prefers to study experimentally the generation of extreme optical pulses, a similar project can be done experimentally in the Semiconductor Laser Lab in Terrassa.
- * Read more: C. Bonatto et al, Phys. Rev. Lett. 107, 053901 (2011);
<http://www.fisica.edu.uy/~cris/lasers2.htm>