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ICFO
The Institute
of Photonic
Sciences



Master in Photonics – “PHOTONICS BCN” Master ERASMUS+ “EuroPhotonics”

MASTER THESIS PROPOSAL

Dates: April 2020 - September 2021

Laboratory: Quantum Optics Theory
Institution: ICFO Institute of Photonic Sciences
City, Country: Castelldefels, Spain

Title of the master thesis: Strong field phenomena driven by waveforms

Name of the master thesis supervisor and co-supervisor: Maciej Lewenstein and Albert Aloy

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Keywords: quantum information science, entanglement, quantum non-locality, quantum randomness

Summary of the subject (maximum 1 page):

Quantum information science is an interdisciplinary area of science connecting physics, computer science and mathematics. It provides a basis for rapidly developing quantum technologies, including quantum computing, quantum simulators, quantum communications and quantum technology.

The project will deal with ultracold atomic systems with long-range interactions: dipolar gases, trapped ions, atoms in nanostructures, or dipolar molecules. The aim will be to design methods for experimental detection of quantumness, quantum coherence, entanglement and quantum non-locality specific for such systems. The work will combine mathematical methods (proving, analytical skills) with theoretical physics (modelling and approximating skills) and practical computer science (numerical and simulation skills).



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Additional information (if needed):

* Required skills : basic understanding of theoretical physics methods and numerical approaches

* Miscellaneous :