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ICFO
The Institute
of Photonic
Sciences



Erasmus+



A*Midex
Initiative d'excellence Aix-Marseille



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

MASTER THESIS PROPOSAL

Dates: April - September 2020

Laboratory : ICFO-QOT

Institution: Institut de Ciències Fotoniques

City, Country : Casteldefels, Spain

Title of the master thesis: Frontiers of Quantum Information Science, Quantum Simulations and Many Body Physics

Name of the master thesis supervisor: Maciej Lewenstein

Email address : Maciej.Lewenstein@icfo.eu

Phone number : 626723233

Mail address : Carrer de Veciana 19, 08023 Barcelona

Keywords : quantum information, quantum simulations, many body physics

Summary of the subject (maximum 1 page):

The MSc student will join one of the running research projects in the ICFO-QOT. The concrete choice will depend on the current efforts in the group (that change adjusting to scientific needs), student's preferences and preparation, availability of supervisor/co-supervisor and resources for a specific theme. At this stage ICFO-QOT can absorb one MSc student in this area. QOT-ICFO studies and develops in particular

- 1) General mathematical theory of quantum correlations, with focus on quantumness, coherence, entanglement and non-locality of states of many body systems,
- 2) Relations between quantum many body phenomena (quantum phase transitions, quantum criticality, quantum localization, superconductivity, isolating states, topological order and topological phenomena



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Additional information :

* Required skills: Good level of theoretical physics, numerical methods and computer skills, good knowledge of mathematical methods of physics and statistics.

* Miscellaneous :