



ERASMUS MUNDUS



EUROPHOTONICS-POESII MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Dates: April 1st, 2016 – September 30th, 2016

Laboratory : ICFO-Institut de Ciències Fotòniques
City, Country :Castelldefels, Barcelona

Title of the master thesis : Quantum correlations in many party systems

Name of the tutor of the master thesis : Maciej Lewenstein

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Summary of the subject (maximum 1 page) :

Quantum information science is one of the leading areas of contemporary science, which focus on development of the technologies of the future -- quantum technologies. Quantum information science has, among other, 5 important areas: quantum computation, quantum simulation, quantum communication, quantum metrology and quantum sensing. In all of these are the theoretic basis is provided by the understanding and studies of quantum properties of multi-party quantum systems: entanglement, non-locality, or in general any kind of properties that sow certain degree of quantumness and can be used as a resource for some useful quantum information task or protocol. Lewenstein's group at ICFO has a long tradition of working on these problems and belongs to the leading groups in the world.

We propose as a subject of the master thesis studies that focus on properties of quantum correlation in few party system consisting of qubits or qutrits, and extending it to genuine many body systems. The study will combine aspects of mathematical analysis with numerical calculations and physical analysis of design of interesting possible implementations and applications

Keywords :

Quantum Information, Entanglement, Quantum Correlations

Additional information :

* Required skills: Good knowledge of the methods of the theoretical physics (from classical mechanics, through electrodynamics, quantum mechanics, statistical physics, if possible quantum field theory)

* Miscellaneous:

