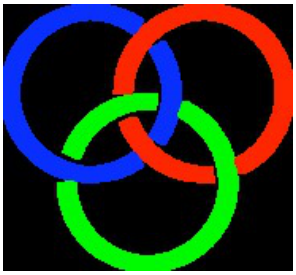

ID de Contribution: **14** Type: **Non spécifié**

Quantum coherence in many-body systems

jeudi 13 octobre 2011 15:00 (40 minutes)

A particularly attractive estimation of the coherence of a quantum system is provided by the Loschmidt echo (or quantum fidelity), which is a measure of the reversibility properties of the system. Most existing results are restricted to single-particle systems evolving in a given Hamiltonian. Our team has extended these studies to systems of interacting particles, revealing an anomalous behaviour of the quantum fidelity, which drops suddenly after an initial quiescent period [1].

The common feature of these investigations was that the inter-particle interaction is treated within the mean field approximation. The exact dynamics of the quantum fidelity for a system of N electrons is an open question of fundamental interest, particularly because confined few-electron systems can nowadays be realized in practice using semiconductor quantum dots [2].

In the framework of a collaboration with the Technical University of Munich (Germany) and the University of Louvain-la-Neuve (Belgium), we are currently developing a numerical approach to study the quantum fidelity for a few-body system of interacting electrons. The goal of this research project is to develop a computationally exact treatment of the quantum evolution of few electrons confined in a two-dimensional harmonic potential with a quartic perturbation and full Coulomb electron-electron interactions. The quantum fidelity provides crucial information on the stability (sometimes critical) and coherence of few-body systems, with both fundamental and practical implications for emerging fields of research such as quantum computing.

[1] G. Manfredi and P.-A. Hervieux, Phys. Rev. Lett. 97, 190404 (2006); Phys. Rev. Lett. 100, 050405 (2008); New J. Phys. 11, 013050 (2009).
[2] T. Sako, P. -A. Hervieux and G. H. F. Diercksen, Phys. Rev. B 74, 045329 (2006).

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