

International Symposium on Decoherence and Foundations of Quantum Mechanics

Informal and friendly, rigorous in the talks

Place: salle Remy Lemaire, Néel Institute, Grenoble
(near the cafeteria of the Nano-Science Dept.)

Date : Wednesday, July 24, 2013

Title: [Classical/Quantum Decoherence and Foundations of Quantum Mechanics](#)

Quantum coherence and decoherence are among the most important concepts in quantum mechanics. They are intensively studied, both theoretically and experimentally, in particular to gain a better understanding of the foundations of quantum mechanics and for crucial applications, such as quantum computing. However coherence and decoherence are also common concepts in classical physics (e.g. waves, classical optics etc...). Key questions remain unanswered. Thus, even though many quantum predictions of decoherence phenomena have been verified experimentally in the study of, e.g., the damping of Rabi oscillations, one can still ask whether the idea of non-local entanglement with environmental degrees of freedom is really necessary to explain such damping. Can one instead appeal to simple local correlations, of classical origin, with the environment, notably during a measurement with a classical measuring tool ? Another important question concerns the way in which observations of decoherence test our current interpretations of quantum mechanics - indeed, can such experiments test quantum mechanics itself ?

This symposium will gather experimentalists and theoreticians. We shall see in detail how Rabi oscillations can be produced and measured in different types of systems (spins, superconducting qubits...), how they are damped by their “their own” environments, and how this can be interpreted theoretically (showing in particular what be limited to classical physics and what is necessarily beyond a classical interpretation). The symposium will be concluded by a discussion on the interpretations of quantum mechanics.



Morning session

- 09H00 – 09H30 [Event-by-event simulation of neutron interferometry experiments](#)
Kristel Michielsen, Jülich Supercomputing Centre, Germany
- 09H45 – 10H15 [Quantum theory as the most robust description of reproducible experiments](#)
Hans De Raedt, University of Groningen, The Netherlands
- 11H30 – 11H00 [EPR analysis of the V15 molecule Hamiltonian: experiments and simulations](#)
Irinel Chiorescu, Florida State University, USA
- 11H15 – 12H15 [The classical Landau-Zener model and decoherence in the classical Rabi regime](#)
Bernard Barbara, Institut Néel, CNRS, Grenoble, France
- 12H30 – 12H50 [Ultrafast quantum nondemolition measurement based on two inductively coupled transmons"](#)
Etienne Dumur, Institut Néel, CNRS, Grenoble, France

Lunch + coffee (CNRS cafeteria, outside)

The coffee machine near the conference room, will be available at the usual rate of 30 cents/cup

Afternoon session

- 14H00 – 14H-30 [Hybrid nano-optomechanics: a quantum emitter coupled to a mechanical oscillator](#)
Benjamin Pigeau, Institut Néel, CNRS, Grenoble, France
- 14H45 – 15H15 [Coherent manipulation of a single nuclear spin](#)
Stefan Thiele, Institut Néel, CNRS, Grenoble, France
- 15H30 – 15H50 [Coherent phase dynamics in Josephson junction chains](#)
Thomas Weissl
- 16H00 – 16H30 [Electron surfing on a sound wave as a platform for quantum optics experiments with flying electrons](#)
Tristan Meunier, Institut Néel, CNRS, Grenoble, France
- 16H45 – 17H15 [Multiple quantum Rabi oscillation probed by bi chromatic EPR](#)
Sylvain Bertaina, CNRS – IM2NP , Aix Marseille Université, Marseille , France
- 17H30 –18H00 [Phase transitions in a cavity system under strong driving field](#)
Seiji Miyashita, The University of Tokyo, Japan

Scientific conclusions (10 mn)

