

CEA - Saclay 91191 Gif-sur-yvette Cedex  
**Service de Physique de l'Etat Condensé**  
**SÉMINAIRE**

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**Mercredi 11 avril 11h15**

**Orme des Merisiers SPEC Salle Itzykson, Bât.774**

**Einstein - de Haas Effect at the Nanoscale: Application to  
Nanocantilevers, Free Atomic Clusters, and Flux Qubits**

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In 1915 Einstein and de Haas demonstrated that the change in the magnetic moment of a freely suspended body results in its mechanical rotation owed to conservation of the total angular momentum. Almost 100 years later the mechanism of the transfer of the atomic angular momentum to the rotation of the body as a whole is poorly understood. Studies of mechanical resonators containing spins or micro-SQUIDs may shed light on this question. This will be illustrated by the exact solution of the problem of a quantum rotator with a spin, by considering spin tunneling in a micro-cantilever, and by analyzing experiments with magnetic molecules bridged between conducting leads. It will be shown that conservation laws dictate unavoidable lower bound on the decoherence of flux, spin, and single-electron qubits. Paradoxically, this kind of decoherence may increase when one tries to weaken interaction of the qubit with the environment.

The seminar will be given in English.

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