

Lecture Series in Condensed Matter and Statistical Physics III

Nonequilibrium Optical Spin Manipulation: A Theoretical Approach

Bahman Roostaei

Indiana University (IUPUI) and IPM

Date: 17rd and 19st Azar 1393

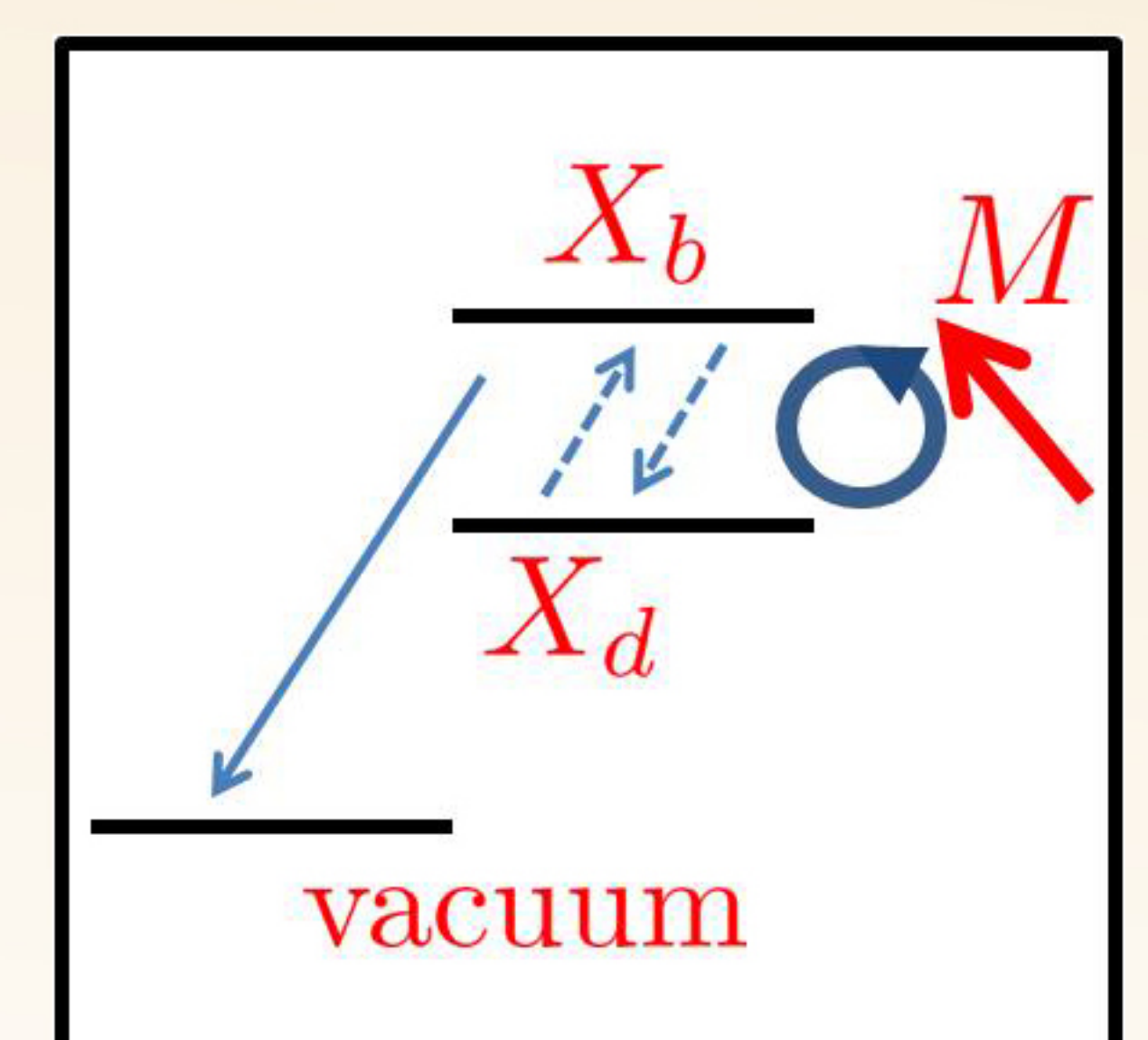
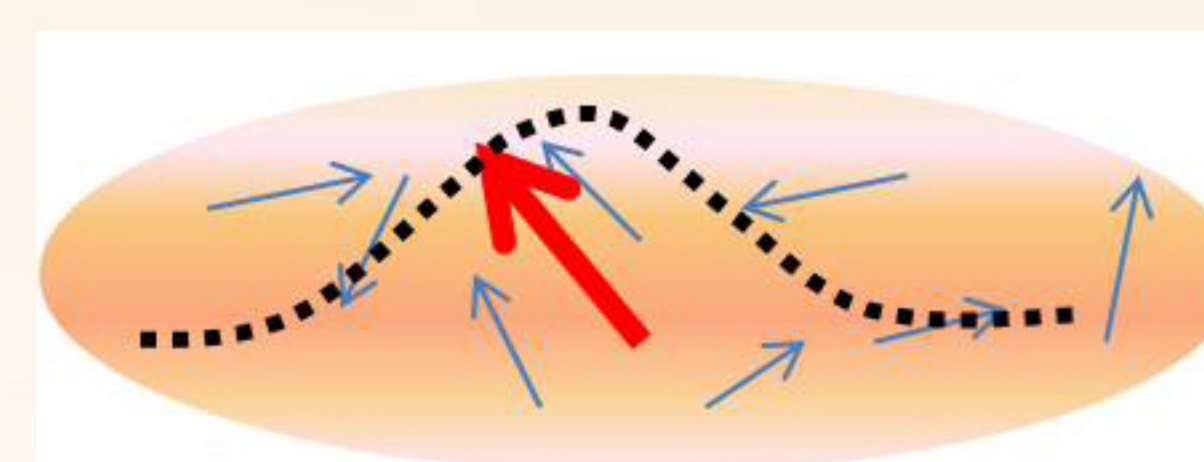
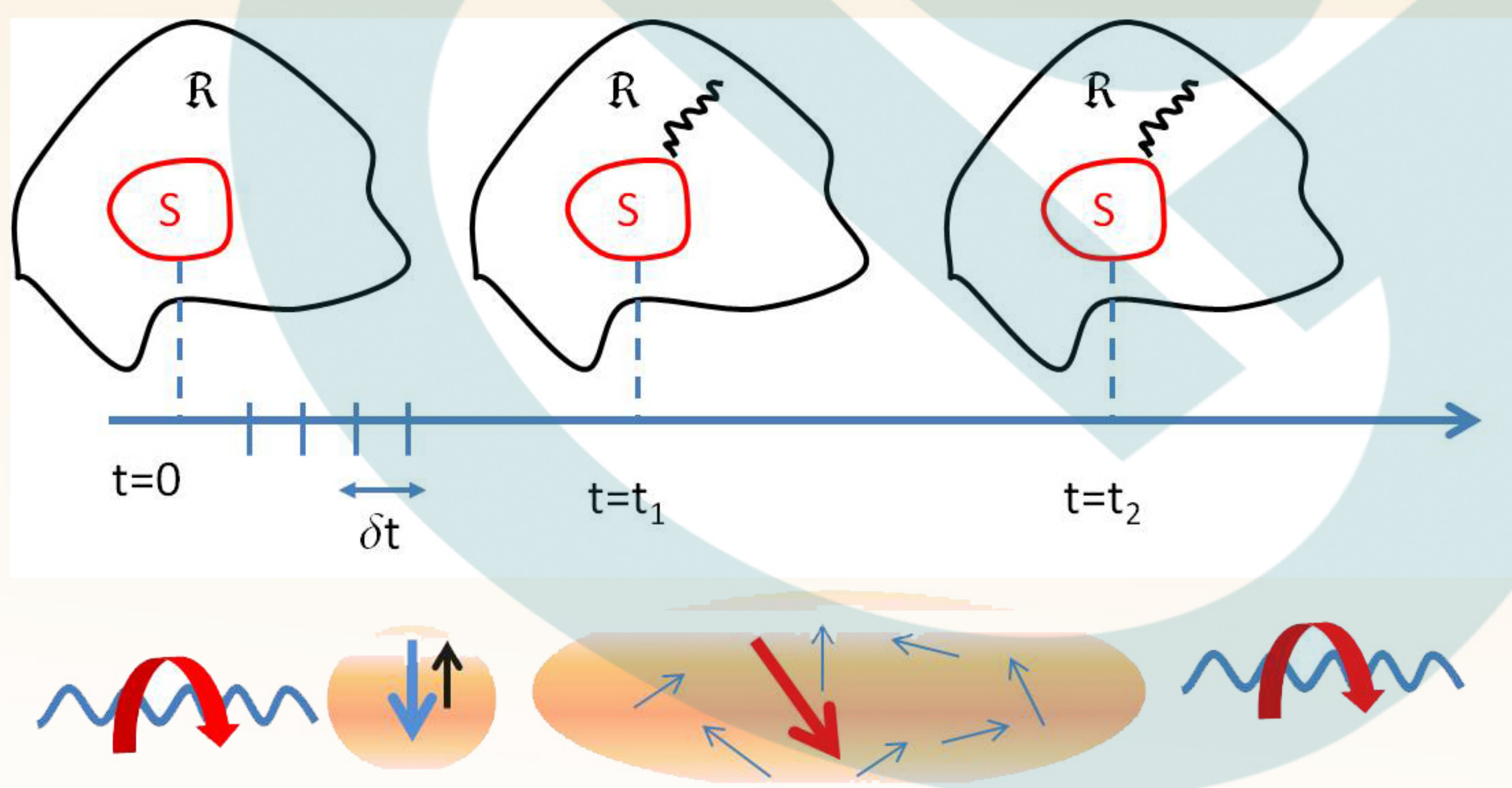
11:00-12:00, 12:30-13:30

School of Physics, IPM, Tehran

Magnetic quantum dots are nano-sized islands made out of semiconducting atoms or molecules such as CdTe with one magnetic ion such as Mn placed inside them. Photoluminescence, on the other hand, is a tool to read the spin state of the magnetic ion. By optical pumping the spin of such ions (using exciton spin transfer) in quantum dots and then probing them via photoluminescence it is possible to write and read information on individual spins in quantum dots. However, the difficulties arise by decoherence effects due to interaction with environmental spins (such as semiconducting nuclei) and, of course, due to the temperature. In these lectures, we focus on some non-equilibrium theories, specifically the quantum jump approach, in order to model these pump-probe phenomena. This way we will be able to understand some of the experiments and predict certain processes that improve the efficiency of such techniques. These lectures intend to familiarize the audience with the quantum jump approach (sometimes called wavefunction Monte- Carlo) and, at the same time, with the optical manipulation of spin states. Tentative topics to be discussed include introduction to dynamic polarization, optical manipulation of moments in quantum dots, evolution of open quantum systems and quantum jump approach, and application of quantum jump approach in dynamic polarization. Basic quantum mechanics and basic density matrix formulation is needed in order to follow most of the talks.

For the schedule of the course and other information, please visit:

<http://physics.ipm.ac.ir/conferences/speciallecture/BahmanRoostaei2/index.jsp>



Farmanieh Seminar Room, Institute for Research in Fundamental Sciences (IPM),
next to Kouhe Nour Building, Farmanieh Ave., Tehran

Tel: (21) 22 28 06 92

Email: conf1@ipm.ir