



Seminar@ISM

organized by
Communications Group



CNR
Istituto di Struttura
della Materia

When?

September 30, 2024
03:00PM (CET)

Where?

@ Aula IB09
Area di Ricerca -
CNR Tor Vergata
Rome

@Social CNR-ISM



Energy & Environment

30

September 2024

Dmitri R. Yakovlev

Experimental Physics 2
TU Dortmund
Germany

Spin physics in lead halide perovskite crystals and nanocrystals

We provide a survey of our experimental studies of coherent spin dynamics of electrons and holes in lead halide perovskite semiconductors: bulk crystals [1-3], nanocrystals [4-5] and 2D structures [6]. Time-resolved Faraday/Kerr rotation techniques was used for that, measurements were performed at cryogenic temperatures and in strong magnetic fields. We measure spin relaxation and spin coherence times, evaluate electron and hole Lande g-factors for a representative set of perovskites with the band gap energy varying from 1.5 to 3.2 eV. We establish universal trends for the g-factors on the band gap energy in bulk materials and show that they are modified by the quantum confinement in perovskite nanocrystals. Strong interaction of hole spins with nuclear spins is found, which is considerably stronger than the one for the electron. Optically detected nuclear magnetic resonance highlights the dominating role of Pb ions in interaction with electrons and holes. Spin mode locking effect based on spin synchronization under periodic laser excitation is found in nanocrystals in glass. Experimental approaches of spin physics give reach information about these materials.

Info at

www.ism.cnr.it/seminar-ism

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