

Plenary Talk

PV VII Wed 9:00 RW 1

Femtosecond Opto-Magnetism: Controlling Magnetism by light — •THEO RASING — Radboud University, Institute for Molecules and Materials

From the discovery of sub-picosecond demagnetization two decades ago to the more recent demonstration of magnetization reversal by a single 40 femtosecond laser pulse, the control and manipulation of spins by ultra short laser pulses has become a fundamentally challenging topic with a potentially high impact for future spintronics, data manipulation and storage and quantum computation. The realization that femtosecond laser induced all-optical switching (AOS) as observed in

ferrimagnets exploits the exchange interaction between their sublattices, opens the way to engineer magnetic materials for AOS. Theoretically, this field is still in its infancy, using phenomenological descriptions of the none-equilibrium dynamics between electrons, spins and phonons. A proper description should include the time dependence of the exchange interaction and nucleation phenomena on the nanometer length scale. A practical challenge is how to bring the optical manipulation of magnetic media to the required nanoscale, which may be possible using plasmonic or wave-shaping techniques. This will allow to probe and control magnetic order on the combined femtosecond time and nanometer length scale.