ΠΑΝΕΠΙΣΤΗΜΙΟ ΙΩΑΝΝΙΝΩΝ

**ΣΧΟΛΗ ΘΕΤΙΚΩΝ ΕΠΙΣΤΗΜΩΝ**

**ΤΜΗΜΑ ΦΥΣΙΚΗΣ**

**ΕΚΤΑΚΤΗ ΟΜΙΛΙΑ**

**ΤΜΗΜΑ ΦΥΣΙΚΗΣ**

**Prof. Hans Wolfgang Spiess**

**Max-Planck-Institute for Polymer Research,**

**Mainz, Germany**

***«Advanced magnetic resonance studies of nanostructured materials and signal enhancement»***

**Δευτέρα 10 Μαρτίου 2014, ώρα 12.00μ.**

**Αίθουσα Σεμιναρίων Τμήματος Φυσικής**

**Βιβλιοθήκη - κτίριο Φ2 - 3ος Όροφος**

**Advanced magnetic resonance studies of nanostructured materials and signal enhancement**

**Hans Wolfgang Spiess**

Max-Planck-Institute for Polymer Research,

P. O. Box 3148, D-55021 Mainz, Germany

Functional nanostructures are in the focus of current soft matter science. They occur in advanced synthetic as well as in biological systems through self-assembly of carefully chosen building blocks. Secondary interactions such as hydrogen bonding, aromatic pi-interactions, and electrostatic forces are of central importance. Here, NMR spectroscopy provides unique and highly selective information on structure and dynamics of such systems, e.g., on hydrogen bond networks in the solid state, stacking, and cooperative molecular motions of discotics, pi-conjugated polymers, metal organic frameworks, and macrocycles.

For full structural and dynamic elucidation, the spectroscopic data have to be combined with other techniques, in particular X-ray scattering, microscopy, dielectric spectroscopy and last, but not least, quantum chemical calculations. Recent examples will be presented and the findings will be related to the function of such materials, such as charge carrier mobility or dielectric constant.

A major drawback of NMR is its inherently low sensitivity. This can be overcome by hyperpolarization, which can be achieved several ways. I will in particular speak about Para Hydrogen Induced Polarization (PHIP), a chemical method, which makes use of the correlation between nuclear spins in Para-hydrogen to create hyperpolarized molecules.