UE 3.9S – Frontiers in resonance methods and protein spectroscopy – 6 ECTS

Instructors’ names:
F. Kateb, P. Vasos, Y. Frapart, D. Abergel, L. Duma

Pedagogical objectives:
Students become acquainted with the state of the art in NMR, including DNP-NMR.

Course pre-requisites:
Core courses of the M2S

Program:
Intramolecular interactions, protein unfolding;
J-couplings, residual couplings, Paramagnetic Relaxation Enhancement for the study of structure and interactions;
Dynamic nuclear polarization, recent developments in NMR instrumentation;
Network, energy exchange of the spins with the network; explain how energy is transferred to the network. Thermodynamic hypothesis (return to Boltzmann equilibrium);
Stochastic processes: definition, white noise, Markov processes, correlation functions.
Introduction of relaxation from the Liouville equation. Redfield – type approach (perturbation).
Applications to proteins: what dynamic information can be accessed by relaxation measurements;
Relaxation in a radiofrequency field;
Relaxation and MRI;
NMR in the solid state.

Acquired skills:
Propose new magnetic resonance experiments.

Evaluation:
Final exam.