

Plenarvortrag

PV IV Di 9:45 Audimax

Beta-detected NMR: radionuclides as probes in biophysics and biochemistry — ●MAGDALENA KOWALSKA — ISOLDE, CERN, Geneva, Switzerland

In chemistry and biochemistry nuclear magnetic resonance (NMR) is currently the most versatile and powerful spectroscopic technique for characterization of molecular structure and dynamics in solution. However, one drawback of the method is its low sensitivity, leading to relatively large amounts of sample, posing constraints on the systems that may be explored.

Beta-detected NMR is an extremely sensitive type of NMR, which makes use of radioactive nuclei. It has been used very successfully in

nuclear physics, where it allows determining with high precision magnetic and quadrupole moments of many exotic nuclei.

Our CERN-ISOLDE project aims at applying beta-NMR for the first time to liquid samples, allowing to study the interaction of different metal ions with biomolecules, such as proteins or nucleic acids. This technique, which relies on the anisotropic emission of beta-particles in the decay of spin-polarized nuclei allows reaching the ultimate limit in sensitivity. In addition, the spins are hyperpolarized using lasers, which results in polarizations of 10-100%. The combination of these two features gives over 10 orders of magnitude more sensitivity than conventional NMR.

This talk will cover the principles of the technique, the ISOLDE setup, and first biological studies and results.