

Seminar über Quanten-, Atom- und Neutronenphysik (QUANTUM)

June 29, 2023 at 2 p.m.
IPH Lorentzraum 05-127

Dr. Leif Schröder
Helmholtz Imaging + DKFZ Heidelberg

Exploring Molecular Cavities in Solution with Reversibly Bound Hyperpolarized Spins

Chemical exchange processes play an important role for various soluble molecular systems with cavities. Hyperpolarized ^{129}Xe gives insights into the underlying kinetics and structure parameters by providing a spin system that comes with several NMR spectroscopic advantages. It contributes to the understanding of synthetic molecules for binding greenhouse gases or characterizes hydrophobic pockets in naturally occurring proteins. This talk gives an overview how ^{129}Xe is a powerful probe to explore such cavities. The nuclear spin of an inert gas is a useful "spy" that reveals, e.g., hidden states of different molecular symmetry. It also enables "spin counting" to quantify the attoliter volume in hollow protein structures. Such structures, normally used by bacteria to adjust their buoyancy in water, may one day also improve medical magnetic resonance imaging. Bacterial gas vesicles fill up with the harmless noble gas xenon according to the ideal gas law and have the potential to serve as powerful MRI contrast agents.