



独立行政法人理化学研究所 仁科加速器研究センター
第175回 RIBF核物理セミナー
RIKEN Nishina Center for Accelerator Based Science
The 175th RIBF Nuclear Physics Seminar

Dynamic nuclear polarization - from polarized target to NMR spectroscopic applications

*This seminar is co-organized with iTHES, RIKEN.

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Nuclear spins are only slightly aligned even in the strong magnetic fields of superconducting magnets because the magnetic energy of nuclear spin is much smaller than thermal energy. Using electron spins in thermal equilibrium, which have 660 times higher magnetic energy, the polarization of nuclear spins can be enhanced through a method called dynamic nuclear polarization (DNP). Utilizing photo-excited non-thermalized electrons instead, nuclear spins can be polarized more than 10% even in a low magnetic field (< 0.5 T) at higher temperature (> 77 K).

We have been utilizing the photo-excited triplet electron spin of pentacene as polarizing agents. With a single crystal of p-terphenyl doped with pentacene, the polarization of proton spin of 34% was obtained, and it corresponded to 250,000 times enhancement in 0.4 T at room temperature.

The DNP method has been separately developed by physicists and chemists. The former created polarized target and polarized filter. The latter applied to NMR spectroscopy and metabolic imaging by MRI. I will introduce this method from both sides.

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RIBF Hall (rm.201), RIBF bldg., RIKEN

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