

Wide-band solid state NMR measurements

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Application Note

Dr Hiraki's group are performing wide-band solid state NMR measurements to investigate the electronic structure of the molecular based strongly correlated electronic materials using a single crystal sample. By the analysis of the angular dependence of NMR spectrum, they detect the spatial distribution of the local susceptibility and its dynamics. The NMR technique is a powerful tool to study a strongly "anisotropic" electronic/crystal structure as like a molecular compound.

In many case, they apply the pressure using clump type pressure cell to modify the crystal structure, as a result, the electronic structure. However, sometimes experiments were limited by the geometrical reason; it is difficult to rotate the pressure cell in the VTI of the superconducting magnet. By using split type magnet, they avoid the geometrical problem.

The measurements of the angular dependence NMR spectrum with single crystal sample under high pressure on the molecular compound, α -(BEDT-TTF)₂I₃ which is predicted to have a "Dirac-cone type band structure" are in progress. The preliminary study under lower pressure region performed by their solenoid type TeslatronH superconducting magnet was already published.[1] We expect to obtain further investigations with the split type one.

[1] Y. Takano et al. J. Phys. Soc. Jpn. **79** (2010) 104704



Experimental set-up

- TeslatronH: 7 T with HelioxVT
- 6 T split pair magnet system and variable temperature insert
- TeslatronH: 9T, 88 mm bore, 10^{-5} homogeneity magnet