# Inelastic neutron scattering on Fe-chalcogenide superconductor Fe(Te,Se) to discriminate the origin of "magnetic resonance mode" by *Q*-dependent $\chi''(E)$ spectra

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The superconducting symmetry of Fe-based superconductors is controversial between s±- and $s_{++}$-wave states, which is one of the hot topics in this field. So-called “magnetic resonance mode” observed by inelastic neutron scattering is initially interpreted as it is caused by the spin fluctuation originating from the interband scattering of quasi particles between the hole pocket (Γ point ~ k=(0,0)) and the electron pocket (M-point ~ k=(1/2, 1/2)), where sign of the order parameter is reversed at each other [1,2]. This is now called $s_{\pm}$-wave. However, Onari *et al.* later took into account damping effect, and then reproduced the resonant peak structure [3]. In this case, order parameter does not change its sign between the Γ and M Fermi Surfacs points, and the superconductivity appears by the orbital fluctuation. This is now referred as $s_{++}$-wave. Thus, we cannot discriminate between $s_{\pm}$ and $s_{++}$-wave by the inelastic neutron scattering.

Recently, Nagai and Kuroki theoretically proposed a method to distinguish the above two models by observing the ***Q***-dependences of the “resonant” peak structure [4]. In this session, we present the result of an inelastic neutron scattering measurements performed on a single crystal of $Fe(Te_{0.5}Se_{0.5})$ with the chopper spectrometer 4SEASONS (BL01, MLF/J-PARC). We attempt to judge whether the superconducting symmetry of $Fe(Te_{0.5}Se_{0.5})$ is s±-wave or $s_{++}$-wave states by comparing the generalized spin susceptibility $\chi''(E)$ at $\boldsymbol{Q}=(\pi,0)$ and $Q=(\pi,\pi)$ in the normal and superconducting state.

References

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