

Pauli-Limited Behaviour in iron-based Superconductor KFe_2As_2 ? (3rd experiment)

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In order to measure the vortex lattice (VL) in clean limited KFe_2As_2 crystals with the field-direction close to the basal a - b plane, we performed 3rd small angle neutron scattering experiment SANS-I at PSI. The aim of the experiment is to confirm Pauli-limiting behaviour in an iron-based superconductor as described in the previous report.

KFe_2As_2 single crystals are moisture sensitive. Then, for the current experiment, we prepared a new mosaic by stacking 8 Al plates together, on which KFe_2As_2 single crystals were aligned with [100] and [001] axes horizontal and fixed by Cytop glue. (See Fig.1)

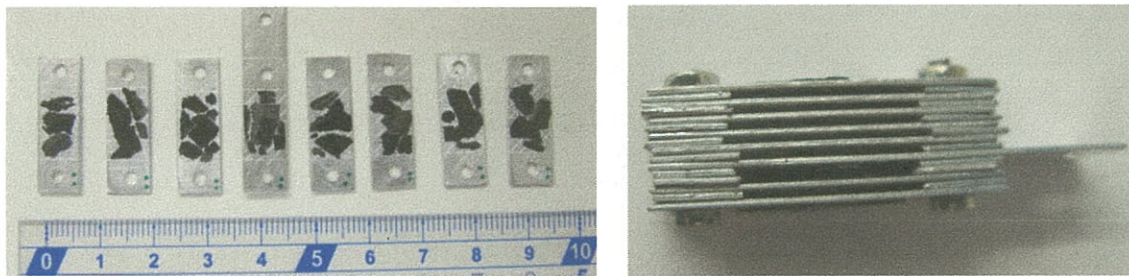


Fig.1 New mosaic of KFe_2As_2 single crystals. We piled up 8 pure Al plates with sample.

In the present experiment, we searched top and bottom peaks of vortex reflections. Fig. 1 shows an example of the diffraction patterns measured at angle 75 deg. and $H=0.6\text{T}$. From the positions of these two spots, anisotropic factor was estimated to be ~ 3.4 . Also in rocking curve of the spot intensity around rotation sample angle, we recognized spin flip diffractions were observed on top of non spin flip scattering. In this time of experiments, we could measure vortex reflection patterns at several fields and angles then we are going to perform detailed analyse for all data to see field direction dependence and field dependence of anisotropic factor and those dependence of spin flip and non spin flip scattering intensity and try to publish the results.

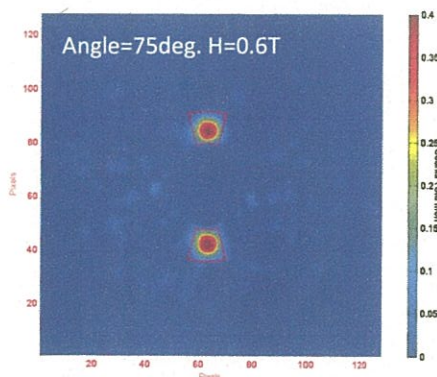


Fig.2 VL scattering pattern $T = 1\text{ K}$.

Finally, we would like to thank financial support for the travel by ISSP since this experiment could not be done without it.