

Polarized neutron diffraction on NaFeAs

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Understanding the role of magnetism in unconventional superconductivity is a central unanswered question in condensed matter physics. This is not only because superconductivity is of practical importance, but just importantly the solution would necessitate a satisfactory understanding of strong correlation in materials.

Towards this end, we study the magnetism in a parent compound of iron-superconductors. We attempted to follow up our earlier work [1] using polarized neutrons to determine dynamic susceptibility in NaFeAs projected along the three crystallographic axes χ_{ii} . This is motivated by the observation of dynamic spin wave modes in another parent compound BaFe_2As_2 [2].

Unfortunately after extensive measurements, we conclude either the flux available at C5 is not sufficient to carry out detailed inelastic measurements on NaFeAs or our samples have deteriorated since our last experiment on IN22 at ILL. For example data in [1] is compared to data on C5 in Fig. 1. We therefore conclude that for our proposed experiment is not feasible within limited beam time on C5 with polarized setup. We are interested in further pursuing measurements on C5 with unpolarized setup and elastic scattering using the polarized setup.

References

- [1] Y. Song et al. Phys. Rev. B 88, 134512 (2013)
- [2] C. Wang et al. Phys. Rev. X 3, 041036 (2014)

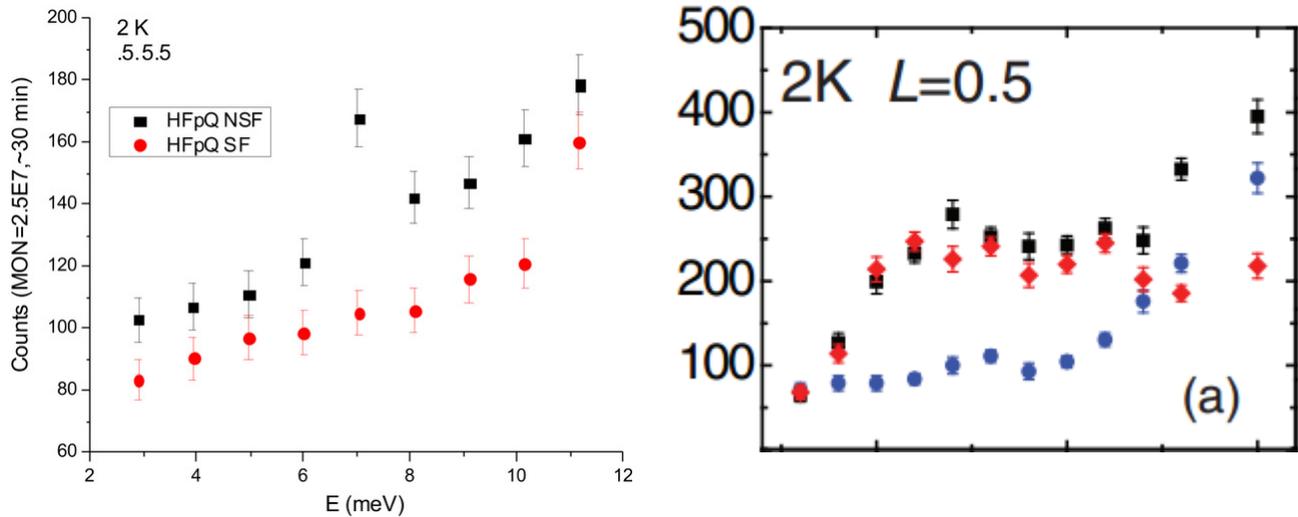


Figure 1 Left is data on C5 and right is data on IN22 [1]. For similar setup, we had ~ 150 counts/15min on IN22 whereas on C5 we had ~ 30 counts/30min. Signal is 10 times smaller on C5, further given the large S/N it would take more than 10 times of beam time to obtain similar statistics.