MLF Experimental Report	提出日 Date of Report 02-02-2017
課題番号 Project No. 2016A0321 実験課題名 Title of experiment Low energy excitations of iron-based spin ladder compound BaFe2S3 実験責任者名 Name of principal investigator Yuan Wei 所属 Affiliation Institute of Physics, Chinese Academy of Science	装置責任者 Name of responsible person 吉沢英樹 装置名 Name of Instrument/（BL No.） BL-12 実施日 Date of Experiment from 05-12-2016 to 07-12-2016

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。（適宜、図表添付のこと）
Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.

$BaFe_2S_3$ single crystal

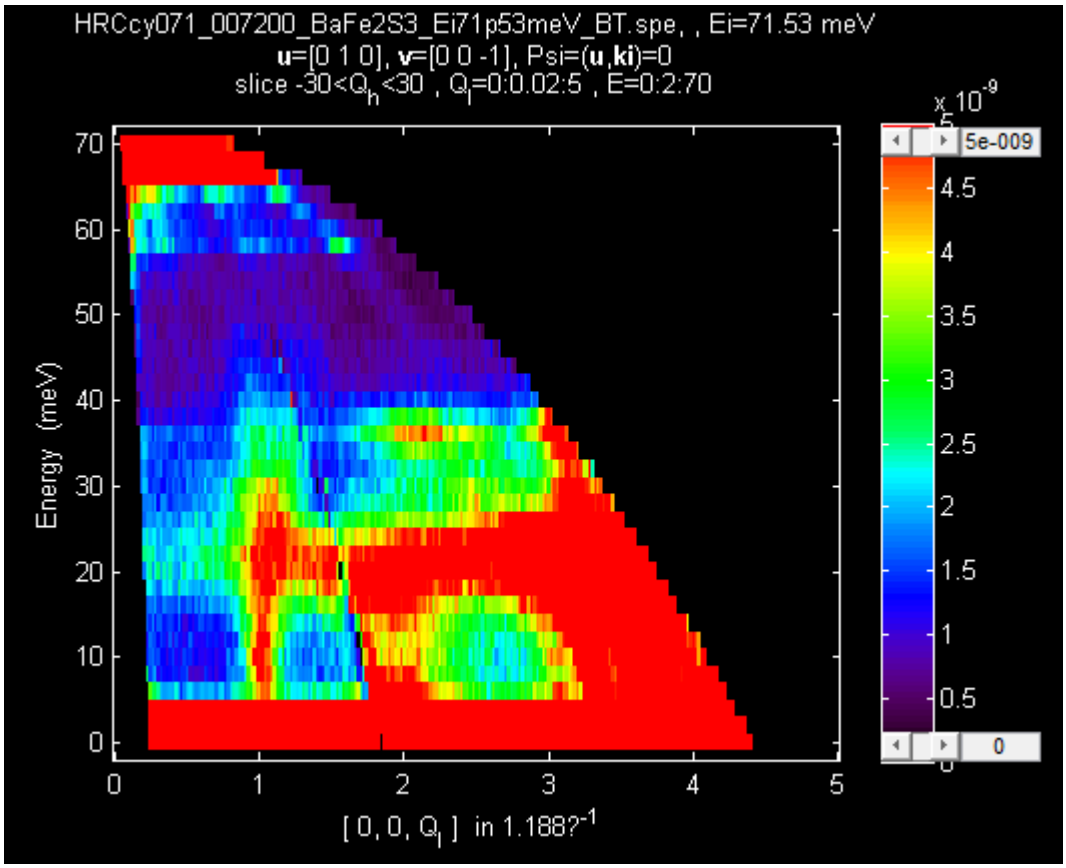
Mass = 5g

Sample is aligned along c direction and contained in Aluminum can.

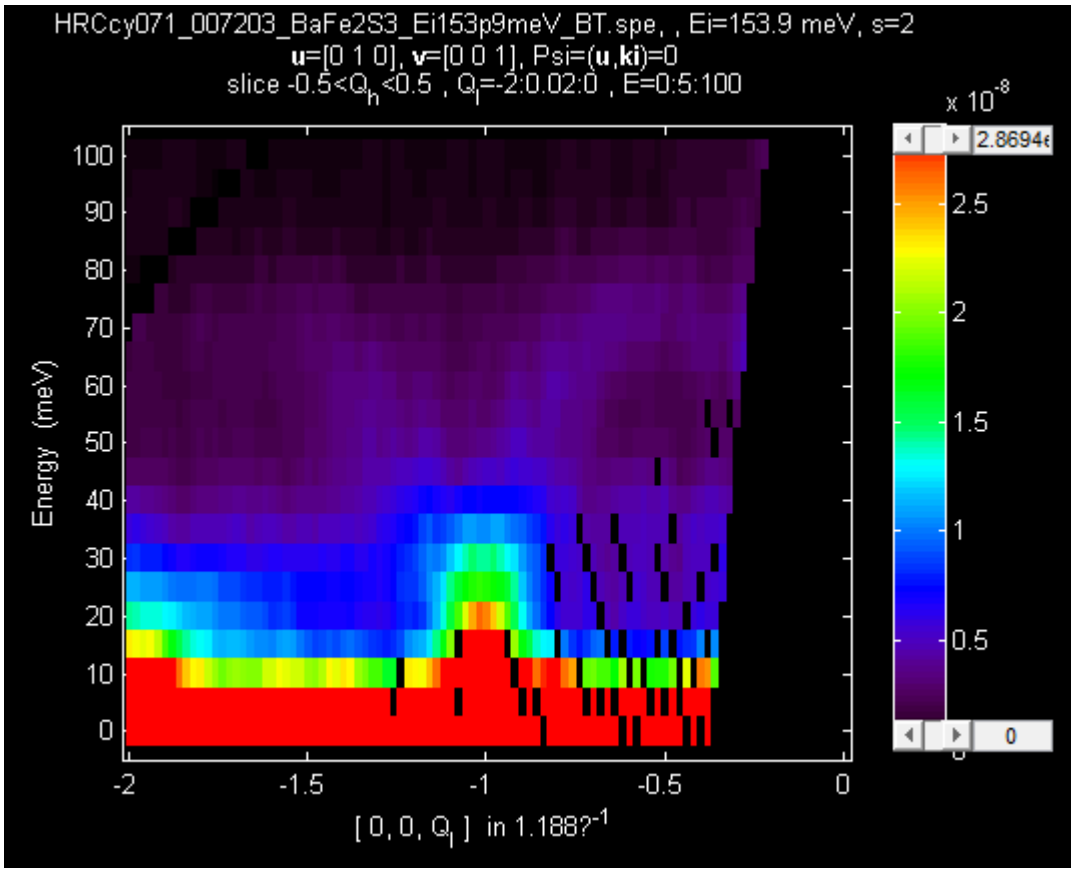
2. 実験方法及び結果（実験がうまくいかなかった場合、その理由を記述してください。）
Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.

1. Using white light to check the sample geometry.
2. Using Ei = 70 meV to check the Phonon of sample.
3. At base temperature using Ei = 70 meV measured magnetic excitation..
4. At base temperature using Ei = 150meV measured the zone boundary.

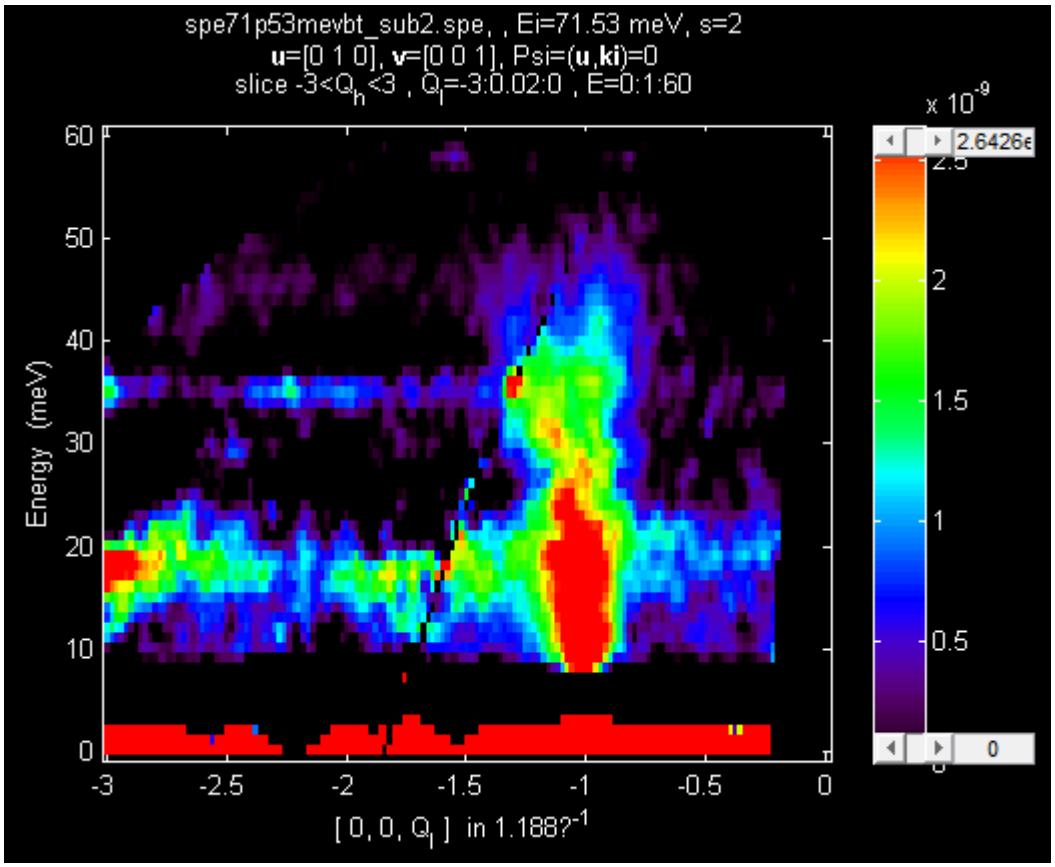
2. 実験方法及び結果（つづき） Experimental method and results (continued)



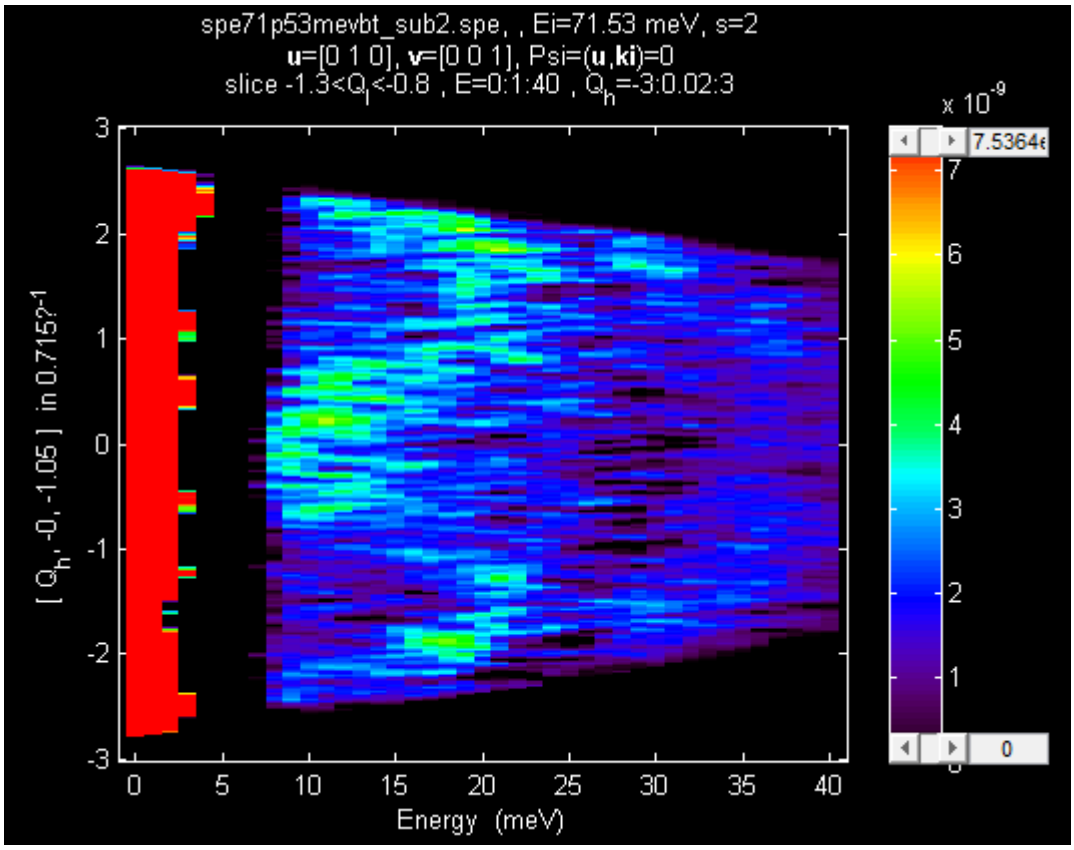
Ei = 70 meV a clear low energy excitation shown at (0,0,1)



Ei = 150 meV shown the zone bondary at (0,0,1)



After subtract the Al backgound, shown the same spin excitation at (0,0,1)



Spin wave along H direction.

Conclusin

The spin wave along L direction is clear and constant with powder data. But the energy cuts are not well symmetrical. This phenomenon may because of the limit sample and beamtime. We still need more beamtime on time-flight method and careful scan on triple-axis spectrometre. After careful calculation, there are two different suit of parameter fit this result well. The mean differences will be shown at optical branch, Which means we still need more beam time up to 300 meV.

We also find a dispersion along H direction. But because of the zone boundary is at 20 meV, which is covered by an Al phone branch. We will measure it clearly at triple-axis spectrometer. The result is different with the simulation. It will help us to correct the model.

We still need more beamtime to improve the data. The differece between spin ladder and iron based superconductor is very important for us to understand the antiferromagnetic correlation.