

実験報告書様式(一般利用課題・成果公開利用)

(※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。)

	提出日 Date of Report Oct. 16, 2012
課題番号 Project No. 2012A0096 実験課題名 Title of experiment Low energy spin excitations in nonsuperconducting $\text{Li}_{0.94}\text{FeAs}$ 実験責任者名 Name of principal investigator Meng Wang 所属 Affiliation Institute of Physics Chinese Academy of Sciences	装置責任者 Name of responsible person Ryoichi Kajimoto 装置名 Name of Instrument/(BL No.) BL No. 1 (4SEASONS) 実施日時 Date and time of Experiment 11:00 on May 7, 2012 -11:00 on May 13, 2012

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.

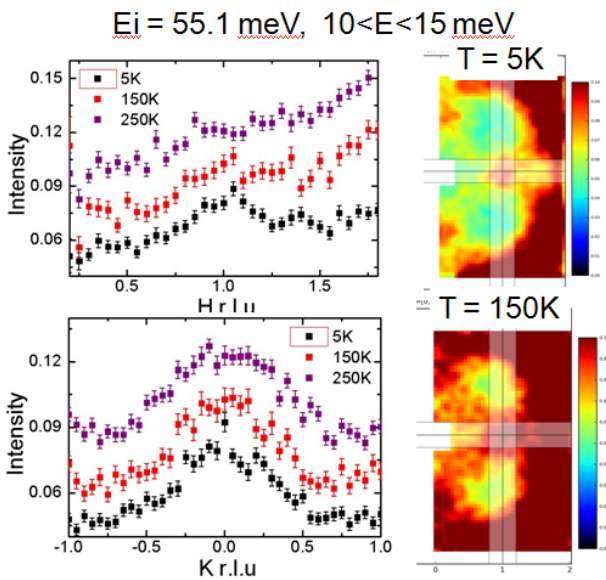
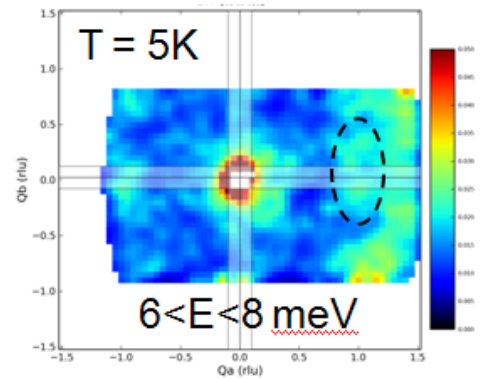
1. 試料 Name of sample(s) and chemical formula, or compositions including physical form. Nonsuperconducting $\text{Li}_{1-x}\text{FeAs}$ $\text{Li}_{0.94}\text{FeAs}$ single crystals
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2. 実験方法及び結果 (実験がうまくいかなかった場合、その理由を記述してください。) Experimental method and results. If you failed to conduct experiment as planned, please describe reasons. 1, Experimental method The incident beam was set to be along c-axis and incident energy was 152 meV. Since 4SEASONS has multi incident energies, we collected the data with $E_i=152, 55.1, 28.2, 17.1\text{meV}$ together. We measured the temperature dependence of the spin excitations at $T=5, 150$ and 250K on 7.8 grams coaligned nonsuperconducting $\text{Li}_{0.94}\text{FeAs}$ single crystals.
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2. 実験方法及び結果(つづき) Experimental method and results (continued)

2, Experimental results

We studied the temperature dependence of the spin excitations in $\text{Li}_{0.94}\text{FeAs}$. For the low energy $6 < E < 8 \text{ meV}$ with $E_i = 17.1 \text{ meV}$, the spin excitation as the dashed ellipse showed is near the edge of the detectors. With this configuration, $E_i = 152 \text{ meV}$, the flux for $E_i = 17 \text{ meV}$ is weak. So we cannot study the temperature dependence of the line-shape change of the spin excitation at low energy.



The left data shows the constant energy cuts along $[H, 0]$ and $[1, K]$ directions and 2D images at 5K and 150K. The cut along K direction indicates the intensity is almost temperature independent at 5, 150 and 250K. It clearly does not follow the Bose population factor. This phenomenon needs further understanding.

The constant energy cut at $70 < E < 80 \text{ meV}$ along K direction has shown the splitting of the spin excitation. This is consistent with the other iron pnictide superconductors.

