

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。)

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課題番号 Project No. 2012A0018 実験課題名 Title of experiment Complete mapping of spin waves in NaFeAs 実験責任者名 Name of principal investigator Chenglin Zhang 所属 Affiliation University of Tennessee	装置責任者 Name of responsible person Ryoichi Kajimoto 装置名 Name of Instrument/(BL No.) BL01 実施日時 Date and time of Experiment 06/08/12-06/13/12

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.
Sodium iron arsenide single crystals NaFeAs

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.
We carried out time of flight experiment on the compound NaFeAs to look at the spin waves in this system. We aligned ~3g single crystals at ORNL and carried out the experiment in the [H,H,L] zone with incident beam parallel to the c axis (or with an offset when probing the L dependence). Our results show that both below and above the structural and magnetic transition the spin waves are transversely elongated, similar to BaFe ₂ As ₂ . The anisotropy does not disappear above the transitions mean either there is a nematic state persisting above these transitions as recently reported after this experiment or the spin Hamiltonian cannot capture the essence of magnetism in this system. We also probed the L dependence of the spin gap, showing L weak dependence, different from BaFe ₂ As ₂ . This indicates the system is more 2 dimensional than BaFe ₂ As ₂ . Since BaFe ₂ As ₂ becomes 2 dimensional upon doping, it might mean the parent compound NaFeAs might correspond to the lightly underdoped region in the phase diagram for BaFe ₂ As ₂ .