**FeSe superconductor from bulk crystal to single unit-cell layer**

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-FeSe has one of the simplest crystal structure among many iron-based superconductors [1,2]. In addition, high-*T*c above 60 K has been reported in a single unit-cell FeSe [3,4]. Because the pairing mechanism is still one of the central issues in Fe-based superconductors, FeSe is an idealistic compound to study the mechanism.

Bulk dynamical magnetic property of FeSe crystal has been studied by inelastic neutron scattering in order to obtain the dynamical spin susceptibility, which shows large enhancement at low energies below the structural transition from tetragonal to orthorhombic structure. At the same time, single unit-cell FeSe structure has been studied by Total-Reflection High-Energy Positron Diffraction [5]. Our preliminary analysis suggests that the FeSe single unit-cell layer is asymmetrically compressed along the normal direction of Fe layer. The asymmetric structure will be discussed in comparison with the energy bands calculated by first-principles calculations.

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References

1. F. C. Hsu *et al*., *Proc. Natl. Acad. Sci. U.S.A.* **105**,14262 (2008).
2. K. W. Yeh *et al*., *Euro. Phys. Lett.* **84**,37002 (2008).
3. S. He *et al*., *Nature Materials* 12 (2013) 605.
4. J.-F. Ge *et al*., *Nature Materials* 14 (2015) 285.
5. Y. Fukaya, G. Zhou, F. Zheng, P. Zhang, L. Wang, Q-K. Xue, and S. Shamoto, to be submitted.