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Soft X-ray Angle-resolved Photoemission Spectroscopy Study on Iron-based Superconductor $Ba_{1-x}K_xFe_2As_2$

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Iron-based superconductors have attracted much attention because of the unexpected high transition temperatures. The mechanism of superconducting state in iron pnictides is considered to be different from high- T_c cuprates. In contrast to two-dimensionality of Co-O plane in cuprates, hole-doped $Ba_{1-x}K_xFe_2As_2$ (BKFA) has been reported to show the superconducting gap depending on k_z momentum. Investigation of bulk three-dimensional electronic structure will provide therefore further understanding of physical properties of BKFA. Soft X-ray angle-resolved photoemission spectroscopy (SX-ARPES) is one of the most promising methods to measure bulk band structure of materials due to the increase of probing depth and high k_z -momentum resolution. In this study, we have investigated the shape and k_z -dependence of the Fermi surfaces (FSs) in BKFA. The experimental FSs show alternating in-plane shapes and modulation along k_z direction corresponding to periodicity of the Brillouin zones. These effects show clear polarization dependence reflecting orbital character of the bands forming the FS. These results provide with experimental information on the dimensionality and orbital character of FSs.

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Poster

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Strongly correlated electron system, high- T_c superconductor, angle-resolved photoemission

Primary author: Dr KOBAYASHI, Masaki (Paul Scherrer Institut)

Co-authors: Mr RAZZOLI, Elia (Paul Scherrer Institut); Prof. DING, Hong (Institute of Physics, Chinese Academy of Sciences); Dr PATHEY, Luc (Paul Scherrer Institut); Prof. OSHIMA, Masaharu (University of Tokyo); Dr SHI, Ming (Paul Scherrer Institut); Dr SCHMITT, Thorsten (Paul Scherrer Institut); Dr STROCOV, Vladimir (Paul Scherrer Institut); Mr HUANG, Yaobo (Institute of Physics, Chinese Academy of Sciences)

Presenter: Dr KOBAYASHI, Masaki (Paul Scherrer Institut)

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