Contribution ID: **87** Type: **Rapid**

Infrared pseudogap in the ab-plane and c-axis responses of the pnictide high-T_c superconductors

Tuesday, 24 July 2012 15:15 (12 minutes)

S. J. Moon[1,2], A. A. Schafgans[1], M. A. Tanatar[3], R. Prozorov[3], A. Thaler[3], P. C. Canfield[3], S. Kasahara[4], T. Shibauchi[5], T. Terashima[4], Y. Matsuda[5], A. S. Sefat[6], D. Mandrus[6,7], and D. N. Basov[1]

[1]Department of Physics, University of California, San Diego, La Jolla, California 92093, USA
[2]Department of Physics, Hanyang University, Seoul 133-791, South Korea
[3]Ames Laboratory and Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011, USA
[4]Research Center for Low Temperature and Materials Science, Kyoto University, Kyoto 606-8502, Japan
[5]Department of Physics, Kyoto University, Kyoto 606-8502, Japan
[6]Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA
[7]Department of Materials Science and Engineering, University of Tennessee, Knoxville, Tennessee 37996, USA

The nature of the pseudogap phase and its relation to high-T_c cuprate superconductors remains a significant yet unresolved problem in condensed matter physics. The central question concerns whether the pseudogap is related to precursor superconductivity or other possible broken symmetry state. Irrespective of the origin, the pseudogap is universally regarded as an essential piece of the physics of unconventional cuprate superconductors. While the pseudogap in the cuprate family of high-T_c superconductors has been extensively documented, spectroscopic manifestations of the pseudogap in the iron-based materials remained elusive.

We report on the infrared studies of the ab-plane and c-axis charge dynamics of a prototypical pnictide system: the $BaFe_2As_2$ (Ba122) family. Our experiments have identified hallmarks of the ab-plane and c-axis pseudogap in the Ba122 system that mirror the spectroscopic manifestations of the pseudogap in the underdoped cuprates. Moreover, the evolution of the charge dynamics across the phase diagram suggests that the pseudogap is not directly related to precursor superconductivity.

Primary author: MOON, Soonjae (Department of Physics, Hanyang University)

Presenter: MOON, Soonjae (Department of Physics, Hanyang University)

Session Classification: Pnictides

Track Classification: Pnictides