Detection of novel electronic order above the structural transition in underdoped $Ba(Fe_{1-x}Co_x)_2As_2$ and $Fe_{1-y}Te$ with point contact spectroscopy

L. H. Greene[1], H. Z. Arham[1], C. R. Hunt[1], W. K. Park[1], J. Gillett[2], S. Sebastian[2] Z. J. Xu[3], J. S. Wen[3], Z. W. Lin[3], Q. Li[3] and G. Gu[3],

[1] University of Illinois at Urbana-Champaign, Urbana, Illinois 61801, USA
[2] Cavendish Laboratory, J. J. Thomson Ave, University of Cambridge, UK
[3] Brookhaven National Laboratory, Upton, New York, 11973, USA

Point contact spectroscopy reveals a novel ordered region above the magnetic and structural transition temperatures for underdoped $Ba(Fe_{1-x}Co_x)_2As_2$ and $Fe_{1-y}Te$. The conductance measured across ballistic nanoscale Au junctions reveals a conductance enhancement starting as high as T = 177 K for the parent pnictide and with decreasing temperature grows reminiscent of a gap opening. The energy scale and temperature dependence of the spectra are consistent with the orbital ordering as detected by ARPES. [2] Similar results are observed in the chalcogenides. We construct a modified phase diagram for the Co:Ba122 showing a new ordered region existing above the structural and antiferromagnetic transitions.

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