Abstract Submitted
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Observation of particle-hole asymmetry and other abnormalities in the normal state of a prototypical electron-doped pnictide high-temperature superconductor.[1] NORMAN MANNELLA, PAOLO VILMERCATI, University of Tennessee - Knoxville, SUNG-KWAN MO, ALEXEI FEDOROV, Lawrence Berkeley National Laboratory, MICHAEL MCGUIRE, ATHENA SEFAT, BRAIN SALES, Oak Ridge National Laboratory, DAVID MANDRUS, University of Tennessee - Knoxville, DAVID SINGH, University of Missouri, WEI KU, Shangai Jiao Tong University, STEVE JOHNSTON, University of Tennessee - Knoxville, UTK COLLABORATION — Understanding high-T_c superconductivity requires a correct description of the normal state, a notoriously challenging task due to varying degrees of electronic correlations and competing orders. The nature of the normal state is still debated, even in the case of the iron-pnictides, some of which are the least correlated of the high-T_c superconductors. Using Angle Resolved Photoemission spectroscopy (ARPES), we show that the hole and electron bands in the prototypical electron-doped pnictide $Ba(Fe_{1-x}Co_x)_2As_2$ exhibit different types of excitations characterized by fundamentally different lineshapes in the normal state. This occurs even when these bands are formed from the same Fe 3d orbitals, indicating that it is the nature of the carriers rather than their orbital character that characterizes the elementary excitations in momentum space. Other anomalies consisting in a highly non-monotonic dependence of electronic properties on Co concentration, including band filling and quasiparticle coherence, will be discussed.

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