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RIXS Study on the Doping Dependence of Elementary Excitations across AFM-SC Phase Boundary in Electron-doped Cuprates[1]

WEI-SHENG LEE, SIMON GERBER, SLAC National Accelerator Lab., USA, Y. B. HUANG, Paul Scherrer Institut, Switzerland, GUICHUAN YU, University of Minnesota, USA, BRIAN MORITZ, SLAC National Accelerator Lab., USA, H. Y. HUANG, R. P. WANG, W. B. WU, NSRRC, Taiwan, V. N. STROCOV, Paul Scherrer Institut, Switzerland, E. M. MOTOYAMA, Stanford University, USA, C. T. CHEN, D. J. HUANG, NSRRC, Taiwan, MARTIN GREVEN, THORSTEN SCHMITT, University of Minnesota, USA, Z. X. SHEN, T. P. DEVEREAUX, SLAC National Accelerator Lab., USA — Tracking the doping dependence of elementary excitations in cuprates is an important approach to gain further insight into the mystery of high temperature superconductivity. Recently, RIXS measurements have revealed two surprising behaviors in the electron-doped cuprates: (i) the bandwidth of magnetic excitation increases, and (ii) an unexpected branch of collective modes emanating from the zone center was found in superconducting compounds, indicating the existence of a quantum phase distinct from superconductivity. Yet, a detailed doping dependence study of these two behaviors in the phase diagram, especially near the antiferromagnetic-superconductivity phase boundary, is still lacking. Here we report doping dependent RIXS measurements on electron-doped cuprates, $Nd_{2-x}Ce_xCuO_4$. Doping dependence of magnetic and these zone-center excitations will be presented.

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