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Band and momentum dependent electron dynamics in Co doped $BaFe_2As_2$ RUDI HACKL, BERNHARD MUSCHLER, WOLFGANG PRESTEL, HANS-MARTIN EITER, Walther Meissner Institut, 85748 Garching, THOMAS P. DEVEREAUX, SIMES, SLAC, Menlo Park, Ca 94025, JAMES G. ANALYTIS, JIUN-HAW CHU, IAN R. FISHER, GLAM, Stanford University, Ca 94304 —
We present results from electronic Raman scattering experiments on high quality $Ba(Fe_{1-x}Co_x)_2As_2$ single crystals revealing details of carrier properties in the normal and in the superconducting states. Due to a light penetration depth on the order of 30 nm the experiment is bulk sensitive. We show that Raman scattering is capable of essentially projecting out the hole and the electron bands separately by using different polarization combinations of the incident and scattered photons. The experiments indicate a strong band and momentum anisotropy of the electron dynamics above and below the superconducting transition highlighting the importance of complex band-dependent interactions. The presence of low energy spectral weight deep in the superconducting state suggests a gap with accidental nodes which may be lifted by doping and/or impurity scattering. Both, the normal state relaxation and the superconducting gap vary substantially with doping x but we do not find evidence of true gap nodes at any x. Along with other experiments we conclude that, in contrast to the cuprates, there is no generic behavior below T_c.

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