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**Studies of Magnetic Impurities in $Bi_2Sr_2CaCu_2O_{8+\delta}$** EDUARDO CALLEJA, JIXIA DAI, University of Colorado at Boulder, GENDA GU, Brookhaven National Laboratory, KYLE MCELROY, University of Colorado at Boulder — Impurities in high temperatures superconductors, studied with spectroscopic imaging scanning tunneling spectroscopy (SI-STS) have served as a valuable tool to investigate the electronic structure of these materials (E.W. Hudson *et al.*, Nature **411**, 920 (2001), S.H.Pan *et al.*, Nature **403**,746 (2000)). These experiments revealed the appearance of a quasi-localized bound state near the impurity site whose structure is sensitive to the superconducting gap symmetry and the band structure and originates from the charge scattering nature of these impurities. We studied the effects of Fe impurities in $Bi_2Sr_2CaCu_2O_{8+\delta}$ and discovered that the impurities have a different behavior than those previously observed. In particular the quasi bound state near the impurity seems to be behaving as that predicted for a magnetic impurity. The superconducting gap and local electronic density of states was studied in the vicinity of the impurities using SI-STS and will be presented.

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