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STM based inelastic electron tunneling spectroscopy on $NdBa_2Cu_3O_{7-\delta}$ — •Pintu Das[1,2], Michael R. Koblischka[1], Helge Rosner[2], Thomas Wolf[3], and Uwe Hartmann[1] — [1]Institute of Experimental Physics, University of Saarland, 66041, Saarbruecken, Germany — [2]Max Planck Institute of Chemical Physics of Solids, Nöthnitzer Str. 40, 01187 Dresden, Germany — [3]Forschungzentrum Karlsruhe GmbH, Institute of Solid State Physics, 76021 Karlsruhe, Germany

Inelastic electron tunneling spectroscopy (IETS) is a very powerful tool to detect collective excitations in conducting materials. Due to inelastic excitation by tunneling electrons, a very weak kink is usually observed in $\mathrm{d}I/\mathrm{d}V$ curves at the bias voltage corresponding to the excitation energy. In IETS on s wave superconductors, phonon modes (ω_{ph}) were observed at energies given by $E = \Delta + \hbar\omega_{ph}$, where Δ is the energy gap. Recently IETS using scanning tunneling spectroscopy (STS) has been used to detect a bosonic mode in $Bi_2Sr_2CaCu_2O_{8+\delta}$ [1]. In the STS data obtained on $NdBa_2Cu_3O_{7-\delta}$ single crystals, we observed peaks in $\mathrm{d}^2I/\mathrm{d}V^2$ curves beyond the coherence peaks from which collective excitation energies of $\sim$ 23 meV and $\sim$ 34 meV have been found for the samples with T_c of 93.5 K and 95.5 K respectively. Band structure calculation shows that there is no structure in the density of state at the observed energies which thus supports the presumption that the observed kinks in $\mathrm{d}I/\mathrm{d}V$ curves are due to inelastic scattering of electrons.

[1] Lee et al., Nature **442**, 546 (2006).

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