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The electron-boson spectral density function of underdoped $Bi_2Sr_2CaCu_2O_{8+\delta}$ and $YBa_2Cu_3O_{6.50}$ JUNGSEEK HWANG, Pusan National University — We investigate the electron-boson spectral density function, $I^2\chi(\omega, T)$, of CuO_2 plane in underdoped $Bi_2Sr_2CaCu_2O_{8+\delta}$ (Bi-2212) and underdoped $YBa_2Cu_3O_{6.50}$ (Y-123) systems using the Eliashberg formalism. We apply a new (in-plane) pseudogap model to extract the electron- boson spectral function. For extracting the spectral function we assume that the spectral density function consists of two components: a sharp mode and the broad Millis-Monien-Pines (MMP) mode. We observe that both the resulting spectral density function and the intensity of the pseudogap show strong temperature dependences: the sharp mode takes most spectral weight of the function and the peak position of the sharp mode shifts to lower frequency and the depth of pseudogap, $1 - \tilde{N}(0, T)$, is getting deeper as temperature decreases. We estimate fictitious (maximum) superconducting transition temperatures, $T_c(T)$, from the extracted spectral functions at various measured temperatures using a generalized McMillan formula. The estimated (maximum) T_c also shows a strong temperature dependence; it is higher than the actual T_c at all measured temperatures and decreases with temperature lowering. Since as lowering temperature the pseudogap is getting stronger and the maximum T_c is getting lower we propose that the pseudogap may suppress the superconductivity in cuprates.

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