Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Exchange boson dynamics in the cuprates THOMAS TIMUSK, JING YANG[1], JUNGSEEK HWANG[2], JULES CARBOTTE, McMaster University, EWALD SCHACHINGER, Graz University of Technology — The electron-boson spectral density function $I^2\chi(\Omega)$ responsible for carrier scattering of high temperature superconductors can be calculated from the optical scattering rate using a maximum entropy technique. Published data on a range of high temperature superconductors (with two notable exceptions) show a peak at an energy (Ω_r) and a broad high frequency background. The energy of the peak is proportional to the superconducting transition temperature $\Omega_r \approx 6.3k_BT_c$ for a large range of materials with T_c's ranging from of 30 K for LSCO up to 130 K for $HgBa_2Ca_2Cu_3O_{8+\delta}$. This relationship in the charge channel compares well with a similar one in the spin channel where the frequency of the magnetic resonance seen by polarized neutron scattering is also found to be proportional to T_c, $\Omega_r^{neutron} \approx 5.4k_BT_c$. The amplitude of both the optical resonance and the magnetic neutron peak decrease strongly with increasing temperature.

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Date submitted: 18 Nov 2009 Electronic form version 1.4