

Abstract Submitted  
for the MAR08 Meeting of  
The American Physical Society

**Optical properties of lattice/spin polarons in underdoped cuprates** SIMONE FRATINI, Institut Neel - CNRS, Grenoble, France, SERGIO CIUCHI, Research Center SMC, INFN-CNR and Dept. Physics, Universita' dell'Aquila, l'Aquila, Italy, EMMANUELE CAPPELLUTI, Research Center SMC, INFN-CNR and Dept. Physics, University La Sapienza, Rome, Italy — In this contribution we investigate the optical spectra of one hole in the Holstein- $t$ - $J$  model. We employ a dynamical mean-field theory which becomes exact in the limit of infinite connectivity. This allow us to investigate the local (incoherent) features which are related to the internal structure of the polaron, disregarding coherent motion which should be reflected in the Drude-like peak. We show that magnetic and electron-phonon interactions sustain each other in establishing polaronic regime. Polaron formation is reflected in a peculiar mid-infrared (MIR) band which is however notably different in the case of a lattice or magnetic origin. The dependence of  $\sigma(\omega)$  on the electron-phonon coupling constant  $\lambda$ , on the exchange interaction  $J$  and on temperature  $T$  is investigated. We compare our results with experimental data in  $\text{Nd}_{2-x}\text{Ce}_x\text{CuO}_4$  showing that the doping and temperature dependences of the optical conductivity in this compounds is naturally reproduced by a spin/lattice polaronic model.

Sergio Ciuchi  
Research Center SMC, INFN-CNR and Dept. Physics,  
Universita' dell'Aquila, l'Aquila, Italy

Date submitted: 05 Mar 2008

Electronic form version 1.4