

Abstract Submitted
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Optical conductivity from cluster DMFT: Formalism and application to high-Tc superconductors¹ NAN LIN, EMANUEL GULL, ANDREW MILLIS, Columbia University — The optical conductivity of the one-band Hubbard model is calculated using the “dynamical cluster approximation” implementation of dynamical mean field theory for parameters appropriate to high-temperature copper-oxide superconductors. We present a scheme for obtaining the vertex corrections and show their significant contributions especially to the conductivity of undoped and lightly doped materials where it strongly affects the above-gap absorption. For parameters $U = 9t$ and $t' = -0.3t$ relevant to high temperature superconductors, at densities of one electron per site an insulating state is found with a gap $\sim 1.8\text{eV}$ similar in magnitude to that observed in La_2CuO_4 . On doping, the gap is rapidly destabilized and absorption appears at low frequencies, again in a manner consistent with the measurements. The mid-infrared feature observed at intermediate dopings is shown to arise from a pseudogap structure in the density of states.

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