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Mid-IR band in cuprates : A consequence of strong electron correlations SHILADITYA CHAKRABORTY, University of Illinois at Urbana - Champaign, DIMITRIOS GALANAKIS, PHILIP PHILLIPS, University of Illinois at Urbana-Champaign — Optical conductivity data in lightly doped cuprates show an anomalous peak - like feature in the mid-IR regime ,not naturally expected of doped Mott insulators. Investigating this phenomenon in the light of strong electron correlations, we employ Cluster Dynamical Mean Field Theory (CDMFT) on a four site square plaquette to compute the optical conductivity in the 2-d Hubbard model as a function of hole doping and temperature. The computed optical conductivity shows a peak in the mid-IR regime, consistent with experimental data. Using Non - Crossing Approximation (NCA) as our impurity solver for CDMFT, we have identified the plaquette eigenstates that give rise to the mid-IR feature. The relevant eigenstate has 4 electrons on a plaquette with zero total spin and spatial properties consistent with $d_{x^2-y^2}$ symmetry.

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