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Strong correlation effects and optical conductivity in electron doped cuprates TANMOY DAS, R.S. MARKIEWICZ, A. BANSIL, Northeastern University — We demonstrate that most features ascribed to strong correlation effects in various spectroscopies such as angle-resolved photoemission spectroscopy (ARPES) and optical spectra of the cuprates are captured by a calculation of the self-energy incorporating effects of spin and charge fluctuations[1]. The self-energy is calculated over the full doping range of electron-doped cuprates from half-filling to the overdoped system. The spectral function reveals four subbands, two widely split incoherent bands representing the remnant of the split Hubbard bands, and two additional coherent, spin- and charge-dressed in-gap bands split by a spin-density wave, which collapses at the AFM quantum critical point (QCP) in the overdoped regime. The transition between the in-gap states leads to pseudogap features in the mid-infrared region of the optical spectra, where the incoherent features persist to high doping even above the QCP, producing a remnant Mott gap. Notably, our results are also in good accord with variational cluster and quantum Monte Carlo calculations. Work supported in part by the USDOE.

[1] Tanmoy Das, R. S. Markiewicz, and A. Bansil, arXiv:0807.4257.

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