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Pairing fluctuations determine low energy electronic spectra in cuprate superconductors SUMILAN BANERJEE, Department of Physics, Indian Institute of Science, Bangalore-560012, India, TIRUPPATTUR RAMAKRISHNAN, Department of Physics, Banaras Hindu University, Varanasi-221005, India, CHANDAN DASGUPTA, Department of Physics, Indian Institute of Science, Bangalore 560012, India — Over the years, Angle Resolved Photo Emission Spectroscopy (ARPES) has uncovered a number of unusual spectral properties of near Fermi energy electrons with definite in-plane momenta in the hole doped cuprates. We describe here a minimal theory of tight binding electrons moving on the square planar Cu lattice of the cuprates, mixed quantum mechanically with pairs of them (Cooper pairs); superconductivity occurring at T_c is their long range (d-wave symmetry) phase coherence. Fluctuations necessarily associated with incipient long range superconducting order have a generic large distance behavior near T_c. We calculate the spectral density of electrons coupled to such Cooper pair fluctuations and show that properties observed in ARPES above T_c for different cuprates as a function of doping x and temperature T emerge inevitably; e.g. the 'Fermi arcs' with T dependent length and an antinodal pseudogap which fills up linearly as T increases towards the pseudogap temperature T^*. Below T_c, the effects of nonzero superfluid density and thermal fluctuations are calculated and compared successfully with experiment.

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