

## Pseudogap and Superconducting Fluctuations in High- $T_c$ Cuprates

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(Received December 8, 1999)

We analyze pseudogap phenomena widely observed in the underdoped cuprates. We assume the existence of a strong d-wave pairing force competing with antiferromagnetic (AFM) fluctuations and the formation of flat and damped dispersion around the  $(\pi, 0)$  and  $(0, \pi)$  region as two important elements caused by the proximity from the Mott insulator. Using the mode-mode coupling theory for the d-wave superconducting (dSC) and AFM fluctuations, we reproduce basic properties of the pseudogap seen in the magnetic resonance, neutron scattering, angle resolved photoemission and tunneling measurements in the cuprates. Then minimal requirements to understand the pseudogap phenomena are clarified as the above two elements. A strong competition of the pairing with the antiferromagnetic fluctuations suppresses the transition temperature thereby generates the pseudogap in the underdoped region while the weakness of the AFM fluctuations leads to the absence of the pseudogap at the optimal doping concentration.

**KEYWORDS:** high- $T_c$  superconductivity, pseudogap, antiferromagnetism,  $d_{x^2-y^2}$ -wave superconductivity, Mott transition, strong-coupling superconductor, mode-mode coupling