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Spectral properties of the two-dimensional t-J model near the Mott transition MASANORI KOHNO, International Center for Materials Nanoarchitectonics, National Institute for Materials Science, Japan — The single-particle spectral function of the two-dimensional t-J model near the Mott transition is studied using cluster perturbation theory to clarify how the spectral-weight distribution transforms to that of the Mott insulator as the doping concentration decreases. Various anomalous features observed in cuprate high-temperature superconductors are collectively explained in the two-dimensional t-J model near the Mott transition [1] as in the two-dimensional Hubbard model [2]. The results imply that the spectral features are primarily related to the proximity of the antiferromagnetic Mott insulator, which has a low-energy spin-wave mode but no low-energy charge excitation, and to the presence of states characterized by different energy scales rather than to the presence of double occupancy, which is completely removed in the t-J model. The results are confirmed to remain almost unchanged as the cluster size is increased from 4×4 to 6×6 sites in cluster perturbation theory by using the non-Abelian dynamical density-matrix renormalization group method [1]. [1] M. Kohno, Phys. Rev. B 92, 085128 (2015). [2] M. Kohno, Phys. Rev. Lett. 108, 076401 (2012).

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