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Spectral properties near the Mott transition in the two-dimensional Hubbard model MASANORI KOHNO, WPI Center for Materials Nanoarchitectonics, National Institute for Materials Science, Japan — Single-particle excitations near the Mott transition in the two-dimensional (2D) Hubbard model are investigated by using cluster perturbation theory. The Mott transition is characterized by the loss of the spectral weight from the dispersing mode that leads continuously to the spin-wave excitation of the Mott insulator [1,2]. The origins of the dominant modes of the 2D Hubbard model near the Mott transition can be traced back to those of the one-dimensional Hubbard model. Various anomalous spectral features observed in cuprate high-temperature superconductors, such as the pseudogap, Fermi arc, flat band, doping-induced states, hole pockets, and spinon-like and holon-like branches, as well as giant kink and waterfall in the dispersion relation, are explained in a unified manner as properties near the Mott transition in a 2D system [1].

[1] M. Kohno, Phys. Rev. Lett. 108, 076401 (2012).
[2] M. Kohno, Phys. Rev. Lett. 105, 106402 (2010).

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