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Nature of the Mott transition in the one- and two-dimensional Hubbard models MASANORI KOHNO, International Center for Materials Nanoarchitectonics, National Institute for Materials Science, Japan — The relationship between the single-particle excitation in the metallic phase and the spin excitation in the Mott insulating phase is discussed, based on the results for the one- and two-dimensional Hubbard models obtained by using the Bethe ansatz, dynamical density-matrix renormalization group method, and cluster perturbation theory [1,2]. By noting that the dispersion relation of the single-particle excitation in the zero-doping limit is directly related to that of the spin-wave excitation of the Mott insulator and that the spectral weight of the single-particle excitation in the electron addition spectrum gradually disappears toward the Mott transition, the nature of the Mott transition can be considered as freezing of the charge degrees of freedom, reflecting the spin-charge separation in the Mott insulator [1,2]. This feature is contrasted with the feature of a Fermi liquid and that of the transition between a band insulator and a metal.

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

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