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Unconventional soft gaps in strongly-correlated systems with coexisting short-range interaction and disorder HIROSHI SHINAOKA, MASATOSHI IMADA, Dept. of Applied Physics, Univ. Tokyo — We report a theoretical study of the Anderson-Hubbard model under coexisting short-range interaction and disorder, which is one of the minimum models of real strongly-correlated materials. We determined the ground-state phase diagram in three dimensions within the unrestricted Hartree-Fock approximation. Although only short-range interaction is present, we found a soft gap in the single-particle density of states of the insulating phases [1]. This unconventional soft gap (soft Hubbard gap) cannot be explained within the conventional theory [2] which ascribes the formation of soft gaps to the long-range part of the Coulomb interaction. We present a phenomenology to clarify the origin of the soft Hubbard gap. We propose a multi-valley energy landscape as their origin. Further support by the exact diagonalization in one dimension beyond the mean-field level is given. Possible experiments to verify the present theory are also proposed. [1] H. Shinaoka and M. Imada, arXiv:0811.2492v1. [2] A. L. Efros and B. I. Shklovskii, J. Phys. C 8, L49 (1975).

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