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Free fermion description of a paramagnetic Mott insulator JOHAN NILSSON, Uppsala University — A scheme is presented that enables a description of a paramagnetic Mott insulator in terms of free fermions. The main idea is to view the physical fermions as a part of a multi-band system and to allow for a correlation between the physical fermions and the auxiliary ones. Technically this is implemented through a non-linear canonical transformation, which is conveniently formulated in terms of Majorana fermions. The transformed Hamiltonian is in the next stage approximated with a free fermion theory. The approximation step is variational and provides an upper bound on the ground state energy at zero or the Free energy at finite temperature. In this way we are able to extend the domain of applicability of mean field theory and free fermions.

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