Delocalization effect of the Hubbard repulsion in two dimensions and exact terms[1] ZSOLT GULACSI, University of Debrecen, Department of Theoretical Physics — The physical reasons explaining the delocalization effect of the Hubbard repulsion U leading in 2D to an insulator to metal transition are analyzed. The study is made in exact terms by deducing exact ground states and ground state expectation values of interest based on a positive semidefinite operator technique [1]. First it is shown that always when this effect is observed, U acts on the background of a macroscopic degeneracy present in a multiband type of system. After this step I demonstrate that acting in such conditions, by strongly diminishing the double occupancy, U spreads out the contributions in the ground state wave function, hence strongly increases the one-particle localization length, and consequently extends the one-particle behavior producing conditions for a delocalization effect [2].

References: [1] Z. Gulacsi, D. Vollhardt, Phys. Rev. Lett. 91,186401(2003); Z. Gulacsi, A. Kampf, D. Vollhardt, Phys. Rev. Lett. 99,026404(2007). [2] Z. Gulacsi, Phys. Rev. B77,245113(2008).

Zsolt Gulacsi
University of Debrecen, Department of Theoretical Physics

Date submitted: 04 Nov 2008   Electronic form version 1.4