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Phase Diagram of a Correlated Band Insulator GEORGE BATROUNI, AXEL EUVERTE, Institut Non-Linéaire de Nice, RICHARD SCALETTAR, Physics Department, UC Davis, SIMONE CHIESA, College William & Mary — The effect of on-site electron-electron repulsion U in a band insulator is explored for a bilayer Hubbard Hamiltonian with opposite sign hopping on the two sheets. Unlike the case of the ionic Hubbard model, which has a closely related noninteracting dispersion relation, no evidence is found for a metallic phase intervening between the Mott and band insulators: The gap in the spectral function monotonically increases with U from its initial band insulating value. The origin of such difference can be traced to the fact that the local interaction in a bilayer favors the formation of independent singlets whereas in the ionic model is responsible for a homogenization of the density and a consequent reduction of band structure effects. We found that the formation of singlets between the planes, and the resulting destruction of antiferromagnetic order occurs much more rapidly than in the case of a symmetric Hubbard bilayer, which has the same sign of hopping in the two sheets.

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