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Absence of superconductivity in the half-filled anisotropic triangular lattice Hubbard model[1] HONGTAO LI, University of Arizona, R.T. CLAY, Mississippi State University, S. MAZUMDAR, University of Arizona — The superconducting κ-(BEDT-TTF)$_2$X salts, with one hole per molecular site and strong dimerization are widely thought to have an effective $\frac{1}{2}$-filled band. The presence of antiferromagnetism (AFM) near superconductivity (SC) in their pressure-temperature phase diagram has led to the suggestion suggest that the SC can be explained within an anisotropic triangular lattice $\frac{1}{2}$-filled band Hubbard Hamiltonian. In this model increasing frustration suppresses the AFM transition, and it has been suggested that d-wave SC appears near the metal/AFM interface. We performed exact diagonalizations on a 16-site periodic anisotropic triangular lattice and determined the full phase diagram. We confirm the Mott metal-insulator transition and AFM, change of the AFM wavevector for large anisotropy, and the presence of a non-magnetic insulating phase. We do not find any hint of long range superconducting correlations. In our results the Hubbard U always suppresses the superconducting pair-pair correlations over their non-interacting value. We conclude that the Hubbard model is too simple to explain the SC in organic charge-transfer solids.

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