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Coulomb-induced pairing in a quarter-filled band model for κ-(BEDT-TTF)$_2$X[1] W. WASANTHI DE SILVA, Mississippi State Univ, NILADRI GOMES, SUMIT MAZUMDAR, Univ of Arizona, R. TORSTEN CLAY, Mississippi State Univ — κ-(BEDT-TTF)$_2$X is a two dimensional organic charge transfer solid superconductor with a hole density of one half per (BEDT-TTF) molecule. With one hole per dimer of molecules, the material is frequently described using an effective 1/2-filled band Hubbard model on an anisotropic triangular lattice. Within this effective model a metal to antiferromagnetic (AFM) semiconductor phase transition is found. Calculations beyond the mean field level, however, have shown absence of superconductivity within the model. We present the results of correlated-electron calculations on the κ-lattice for up to 64 BEDT-TTF molecules using the Constrained Path Monte Carlo (CPMC) and Path Integral Renormalization Group (PIRG) methods over a wide range of carrier density. We show that superconducting pair-pair correlations in this model are enhanced by electron-electron (e-e) interactions for d-wave pairing symmetry uniquely for hole density close to quarter-filling. Our results indicate that this enhancement of superconductivity is not related to the presence of AFM order, but to the strong tendency to spin-singlet formation in the quarter-filled band.

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