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Temperature dependence of charge-ordering in $(TMTCF)_2X$, C = S, Se[1] SUMIT MAZUMDAR, University of Arizona, RAHUL HARDIKAR, R. TORSTEN CLAY, Mississippi State University — Quasi one-dimensional 1/4-filled band charge transfer solids (CTS) undergo two distinct phase transitions as temperature decreases. At high temperature ($\approx$ 100K) these materials undergo a $4k_F$ (period- two) charge or bond ordering transition. At low temperature, these CTS undergo a magnetic transition to either a spin-Peierls (SP) or anti-ferromagnetic (AFM) ground state, both of which coexist with charge-order (CO). Understanding the relationship between the high and low temperature CO states is a key problem here. We show that (i) the critical nearest neighbor Coulomb interaction V that drives the high temperature Wigner crystal CO is spin-dependent; (ii) as a consequence, for intermediate values of V, there occurs a transition from the Wigner cystal CO to a Bond-Charge-Density wave (BCDW) can occur as temperature decreases. This transition is consistent with recent NMR observations of a charge redistribution occurring simultaneously with the SP state. Our theory is able to explain the competition between the Wigner crystal and SP phases, as well as the occurrence of two difference AFM phases.

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R. Torsten Clay
Mississippi State University

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