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The pseudogap phase in $(TaSe_4)_2I$ ANDRAS VANYOLOS, BALAZS DORA, ATTILA VIROSZTEK, Department of Physics, Budapest University of Technology and Economics, 1521 Budapest, Hungary — We have developed the mean-field theory of coexisting charge-density wave (CDW) and unconventional charge-density wave (UCDW). The double phase transition manifests itself in the thermodynamic quantities and in the magnetic response, such as spin susceptibility and nuclear spin-lattice relaxation rate. Our theory qualitatively applies to the quasi-one dimensional CDW material $(TaSe_4)_2I$. This material exhibits peculiar properties: above the CDW transition temperature T_c, thermal fluctuations were found to die out rapidly, but robust pseudogap behavior is still detected. Namely, the experimental findings include: (i) sharp increase of the static spin susceptibility above T_c, (ii) smooth increase of the spin-lattice relaxation rate above T_c, (iii) as opposed to conventional CDW, no sharp feature in the spin-lattice relaxation rate below T_c. We have found that our coexisting CDW+UCDW model qualitatively describes these observed properties of $(TaSe_4)_2I$. Direct calculations for the magnetic response are shown to evidence the agreement. We also argue, that the fluctuations around T_c are suppressed due to the presence of the "hidden" UCDW phase, which partially gaps the Fermi surface, and causes non-Fermi-liquid (pseudogap) behavior.

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