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Effects of frustrating hopping on charge ordered states in itinerant fermion systems for arbitrary concentration in 2D lattice

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There is ongoing, intense, research in the field of electron charge orderings (CO) and charge density waves phenomena, due to experimental discovery of such phases in numerous important compounds. The aim of this work is to extend recent advances in the field by studying two simple effective paradigmatic models used to describe CO in narrow band materials i.e. (i) a model of correlated electrons: the so-called t-W model of spinless fermions with repulsive interaction W and (ii) the molecular crystal model with the coupling to intramolecular (crystal field) vibrations in the static limit. Our calculations are performed within the (broken symmetry) HFA for $d = 2$ square lattice and arbitrary carriers concentration. In this contribution we focus on the effects of next-nearest-neighbor hopping (t_2) on the CO states in these systems and the problem of phase separations, considering two types of CO: (i) checkerboard CO with the nesting vector Q = (π, π) and (ii) collinear CO with the nesting vector Q = (0, π) or Q = (π, 0). The results we show here are an extension of our previous work on the subject.