Collective Excitations and Stability of the Excitonic Phase in the Extended Falicov–Kimball Model DENIS I. GOLOSOV, Dept. of Physics, Bar-Ilan University, Israel — We consider the excitonic insulator state (often associated with electronic ferroelectricity), which arises on the phase diagram of an extended spinless Falicov–Kimball model (FKM) at half-filling. Within the Hartree–Fock approach, we calculate the spectrum of low-energy collective excitations in this state up to second order in the narrow-band hopping and/or hybridisation. This allows to probe the mean-field stability of the excitonic insulator. The latter is found to be unstable when the case of the pure FKM (no hybridisation with a fully localised band) is approached. The instability is due to the presence of another, lower-lying ground state and *not* to the degeneracy of the excitonic phase in the pure FKM. The excitonic phase, however, may be stabilised further away from the pure FKM limit. In this case, the low-energy excitation spectrum contains new information about the properties of the excitonic condensate (likely including the critical temperature).

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