Charge density waves and off-diagonal order in the 1D Bose-Fermi-Hubbard model for fast fermions ALEXANDER MERING, MICHAEL FLEISCHHAUER, Technical University of Kaiserslautern, Germany — We discuss the Bose-Fermi-Hubbard model in 1D in the limit of fast (light) fermions. In this case, the fermions act as virtual quanta giving rise to an effective long-range interaction for the bosons, favouring a charge density wave (CDW) at $q = 1/\rho_F$ at small bosonic hopping. We derive an effective theory predicting accurately the CDW amplitude if the mean-field backaction of the bosons is included in the free dynamics of the fermions. The analytic predictions are compared to numerical DMRG results giving evidence that a finite CDW is associated with exponentially decaying bosonic correlations thus questioning the existence of a supersolid phase.

Alexander Mering
Technical University of Kaiserslautern, Germany