Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Phonon-mediated repulsion, sharp transitions and (quasi)self-trapping in the extended Peierls-Hubbard model[1] JOHN SOUS, University of British Columbia, MONODEEP CHAKRABORTY, Department of Physics, Indian Institute of Technology, Kharagpur, India, ROMAN KREMS, Univiversity of British Columbia, MONA BERCIU, University of British Columbia — We study two identical fermions, or two hard-core bosons, in an infinite chain and coupled to phonons by interactions that modulate their hopping as described by the Peierls/Su-Schrieffer-Heeger (SSH) model. We show that exchange of phonons generates effective nearest-neighbor repulsion between particles and also gives rise to interactions that move the pair as a whole. The two-polaron phase diagram exhibits two sharp transitions, leading to light dimers at strong coupling and the flattening of the dimer dispersion at some critical values of the parameters. This dimer (quasi)self-trapping occurs at coupling strengths where single polarons are mobile. This illustrates that, depending on the strength of the phonon-mediated interactions, the coupling to phonons may completely suppress or strongly enhance quantum transport of correlated particles.

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Date submitted: 21 Nov 2016 Electronic form version 1.4