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Impact of spin-orbit coupling on the Holstein polaron

ZHOU LI, Department of Physics, University of Alberta, LUCIAN COVACI, Universiteit Antwerpen, MONA BERCIU, University of British Columbia, DEVIN BAILLIE, FRANK MARSIGLIO, University of Alberta — We utilize an exact variational numerical procedure to calculate the ground state properties of a polaron in the presence of a Rashba-like spin orbit interaction. Our results corroborate with previous work performed with the Momentum Average approximation and with weak coupling perturbation theory. We find that spin orbit coupling increases the effective mass in the regime with weak electron phonon coupling, and decreases the effective mass in the intermediate and strong electron phonon coupling regime. Analytical strong coupling perturbation theory results confirm our numerical results in the small polaron regime. A large amount of spin orbit coupling can lead to a significant lowering of the polaron effective mass

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