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Calculation of Correlation Functions using the Momentum Average Approximation GLEN GOODVIN, MONA BERCIU, University of British Columbia — The Momentum Average (MA) approximation has been successfully applied to a growing number of Hamiltonians involving electron-phonon (el-ph) coupling since its discovery only a few years ago. This analytical non-perturbative approximation is exact in both the zero bandwidth and zero el-ph coupling limits, and by summing all of diagrams in the full diagrammatical expansion of the self-energy, albeit with approximations made on each of them, it gives highly accurate results over the entire parameter space. In this work we explore another significant generalization of the approximation by using MA to calculate correlation functions, where the optical conductivity of the Holstein polaron is used as a specific example. A comparison of the MA results against available numerical data again displays a high degree of accuracy for very minimal computational effort. Based on our previous generalizations of MA to systems with momentum-dependent el-ph couplings, we argue that MA could be used to study the linear response of an even broader class of problems.

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