Effective interactions in multi-band systems from constrained summations CARSTEN HONERKAMP, RWTH Aachen University, Germany — The application of many-body techniques for the study of correlation effects and unconventional superconductivity requires the formulation of an effective low-energy model that contains only the relevant bands near the Fermi level. However the bands away from the Fermi level are known to renormalize the low-energy interactions substantially. Here we compare different schemes to derive low-energy effective theories for interacting electrons in solids. The frequently used constrained random phase approximation (cRPA) is identified as a particular resummation of higher-order interaction terms that includes important parts of of the leading virtual corrections. We then propose an adapted renormalization group scheme that includes the cPRA, but also allows one to go beyond the cRPA approximation. We study a simple two-band model in order to demonstrate the differences between the different approximations.

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