Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Low-energy effective interactions beyond cRPA by the functional renormalization group MICHAEL KINZA, CARSTEN HONERKAMP, RWTH Aachen University — In the derivation of low-energy effective models for solids targeting the bands near the Fermi level, the constrained random phase approximation (cRPA) has become an appreciated tool to compute the effective interactions. Here we present applications of a constrained functional renormalization group (cfRG) scheme to two simple multi-band systems and compare the resulting effective interactions to the cRPA. The employed wick-ordered fRG scheme generalizes the cRPA approach by including all interaction channels in an unbiased way. First we consider a multiband model for graphene, where we integrate out the σ-bands to get an effective theory for π-bands. It turns out that terms beyond cRPA are strongly suppressed by xy-plane reflection-symmetry of the bands and that in our model, the cRPA stays qualitatively correct even if one breaks this symmetry slightly. The second example is a model for a Cu-O-chain, where we consider an effective theory for the Cu 3d-orbital. Here the fRG data points to relevant corrections compared to the cRPA results.

Michael Kinza
RWTH Aachen University

Date submitted: 14 Nov 2014 Electronic form version 1.4