Parquet approximations for disordered electrons

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The Anderson model of noninteracting disordered electrons is studied using the diagrammatic perturbation technique formulated in terms of Green's functions averaged over all configurations of the disorder. We utilize the topological nonequivalence of the two-particle scattering channels to formulate self-consistent equations for the two-particle vertices, the so-called parquet scheme. The vertices then determine transport coefficients in the framework of the linear response theory.

The classification of the two-particle diagrams into non-equivalent channels is possible only if the one-particle Green's functions entering the diagrams are non-local, which is achieved by considering all local contributions as being irreducible. Since the sum of all local scatterings corresponds to the coherent potential approximation (CPA), the parquet scheme takes the form of an expansion around the CPA and thus offers a systematic way to incorporate non-local quantum coherence into the description of disordered electrons.

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