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A diagram approach to the strong coupling in the single-impurity Anderson model

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Abstract

We propose a diagram theory around the atomic limit for the single-impurity Anderson model in which the strongly correlated impurity electrons hybridize with free (uncorrelated) conduction electrons. Using this diagram approach, we prove a linked-cluster theorem for the vacuum diagrams and derive Dyson-type equations for localized and conduction electrons and the corresponding equations for mixed propagators. The system of equations can be closed by summing an infinite series of ladder diagrams containing irreducible Green's functions. The result allows discussing resonances associated with quantum transitions at the impurity site.