Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Double expansion with respect to U and $1/(N-1)$ for an SU(N) impurity Anderson model AKIRA OGURI, MIYUKI AWANE, Department of Physics, Osaka City University — We apply a new large-N scheme for an SU(N) impurity Anderson model [1,2] to the Green's function for finite frequency ω and finite Coulomb interaction U. This approach is essentially different from the conventional large-N theories, such as the non-crossing approximation and its extensions which are based on a perturbation expansion in the hybridization strength V. Our expansion scheme, which uses $1/(N-1)$ and the scaled interaction $u \equiv (N-1)U$ as a set of two independent variables, gives the Hartree-Fock (HF) results at zeroth order. Then, to leading order in $1/(N-1)$ it describes the Hartree-Fock random phase approximation (HF-RPA). The higher-order corrections systematically describe the fluctuations beyond the HF-RPA. It was shown that the renormalized local-Fermi-liquid parameters, calculated up to order $1/(N-1)^2$, agree closely with the exact NRG results at $N = 4$ where the degeneracy is still not so large [1,2]. We discuss the ω dependence of the Green's function to clarify both the low- and high-energy features.

[1] A.O., R. Sakano, and T. Fujii, PRB **84**, 113301 (2011).
[2] A.O., PRB **85**, 155404 (2012).

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Date submitted: 10 Nov 2013 Electronic form version 1.4