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**Continuum Numerical Renormalization Group** NANDAN PAKHIRA, Department of Physics, Georgetown University, Washington, DC 20057, USA, HULLIKEL KRISHNAMURTHY, Department of Physics, Indian Institute of Science, Bangalore 560012, India, JAMES FREERICKS, Department of Physics, Georgetown University, Washington, DC 20057, USA — The numerical renormalization group (NRG) has emerged as one of the most powerful techniques for calculating emergent renormalized low-temperature properties of strongly correlated systems. When applied as an impurity solver within the dynamical mean-field theory (DMFT), it allows one to directly find spectral functions and how they evolve with temperature. In spite of this success, the NRG method has a number of well-known shortcomings. It fails to properly produce the Fermi liquid state down to T=0 in DMFT and hence it does not properly calculate transport, and it produces only semiquantitative features of the spectral functions. We believe, this is mainly due to the fact that the spectral representation involves a discrete set of delta function peaks at logarithmically discretized frequency intervals which are broadened to the continuum. The broadening parameters are chosen in an *ad-hoc* basis. Here we formulate this problem as a discrete degree of freedom embedded in a continuum, which involves coupling the original semi-infinite NRG chain to another semi-infinite chain, arising from the neglected continuum degrees of freedom. This residual coupling can be solved perturbatively and provides an *ab initio* approach to constructing spectral functions from the NRG.

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