

Abstract Submitted
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DMRG meets NRG¹ ANDREAS WEICHSELBAUM, Arnold Sommerfeld Center (LMU), Munich, Germany, FRANK VERSTRAETE, Institute for Quantum Information, Caltech, Pasadena, US, ULRICH SCHOLLWÖCK, Institut für Theoretische Physik C, RWTH-Aachen, Germany, J. IGNACIO CIRAC, Max-Planck-Institut für Quantenoptik, Garching, Germany, JAN VON DELFT, Arnold Sommerfeld Center (LMU), Munich, Germany — We present a unified framework of renormalization group methods, including Wilson’s numerical renormalization group (NRG) and White’s density-matrix renormalization group (DMRG), within the language of matrix product states. This allows to improve over Wilson’s NRG for quantum impurity models by a variational method optimal in this framework. We illustrate it for the single-impurity Anderson model; moreover we use a variational method for evaluating Green’s functions. The proposed method is more flexible in its description of off-resonance spectral properties, opening the way to time-dependent, out-of-equilibrium impurity problems. It also substantially improves computational efficiency for one-channel impurity problems, suggesting *linear* scaling of complexity for n -channel problems.

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