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General framework of non-Abelian SU(N) symmetries for matrix product states ANDREAS WEICHSELBAUM, JAN VON DELFT, Ludwig Maximilians University, Munich, Germany — We present a generic numerical framework for the treatment of an arbitrary set of non-abelian quantum symmetries within the matrix product states (MPS) approach and generalization thereof. The framework is based on the simple observation that Clebsch Gordan coefficient spaces can be split off as tensor products for all objects relevant within MPS [1]. As such it is applicable, for example, to the numerical as well as the density matrix renormalization group (NRG or DMRG, respectively). The framework is applied to a generalized SU(3) channel-symmetric Anderson impurity model within the NRG. This model of a fully screened spin $S = \frac{3}{2}$ Anderson model has been suggested recently as the effective microscopic Kondo model for Fe impurities in gold or silver [2]. Results are presented on the explicit treatment of U(1)⊗SU(2)⊗SU(3) for charge, spin, and channel, respectively. This is compared to the alternative description in terms of $SU(2)^{\otimes 4}$ symmetries for total spin and particle-hole symmetry in every channel.

[1] Singh et al, PRA **82**, 050301 (2010)
[2] Costi et al, PRL **102**, 056802 (2009).

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