Non-perturbatively Renormalized Light Quark Masses with Two Dynamical Fermions

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Abstract: The results of a partially quenched ($N_f = 2$) study of the light hadron spectrum, decay constants and quark masses, with non-perturbative renormalization, are presented. Numerical simulations are carried out on a $24^3 \times 48$ lattice with the LL-SSOR preconditioned Hybrid Monte Carlo with two degenerate dynamical fermions, using the plaquette gauge action and the Wilson quark action at $\beta = 5.8$ ($a^{-1} = 3.2(1)$). Finite volume, discretization and sea quark effects have been investigated performing simulations at a smaller volume, with a different lattice coupling and in the quenched approximation. An important point of distinction with respect to the most of previous partially quenched calculations is the non-perturbative renormalization. From the use of non-perturbative renormalization constants, it follows that partially quenched results for the light quark masses do not significantly differ from quenched values.