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Renormalization constants for $N_f = 2 + 1 + 1$ twisted mass QCD

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We summarize recent non-perturbative results obtained for renormalization constants computed in the RI'-MOM scheme for $N_f = 2 + 1 + 1$ twisted mass QCD. Our implementation employs the Iwasaki gauge action and four dynamical degenerate twisted mass fermions. Renormalization constants for scalar, pseudo-scalar, vector and axial operators, as well as for the quark propagator, are computed at three different values of the lattice spacing, two different volumes and several values of the twisted mass. Our method allows for a precise cross-check of the running, because of the particular proper treatment of the hypercubic artifacts. Preliminary results for twist-2 operators are also presented.

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