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# The neutron-proton mass difference

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We present a Lattice calculation of the mass difference between neutron and proton, obtained at 1st order in the $QED$ coupling $\alpha_{EM}$ and in the mass difference between $u$ and $d$ quarks $\frac{m_d - m_u}{\Lambda_{QCD}}$. We adopt a purely hadronic scheme to renormalize the theory and to separate the $QED$ and strong $IB$ contributions.
The simulation is carried out using the ETMC gauge configurations with $N_f = 2 + 1 + 1$ dynamical quarks. We extrapolate among 3 values of the lattice spacing and pion masses in the range \mbox{$M_\pi \simeq 200 - 450$ MeV}.

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