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Sea quark QED effects and twisted mass fermions

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We show that maximally twisted mass fermions can be employed to regularize on the lattice the fully unquenched QCD+QED theory with vanishing theta-term. We discuss how the critical mass of the up and down quarks can be conveniently determined beyond the electroquenched approximation by imposing that certain symmetries of continuum QCD+QED, which are broken by Wilson terms, are restored (up to cutoff effects). A mixed action setup is sketched that allows to extend the computation of the leading isospin breaking corrections to physical observables via the RM123 method beyond the electroquenched approximation by using ETMC (pure QCD) gauge configurations with $N_f=2+1+1$ dynamical quark flavours, with only $O(a^2)$ lattice artifacts.

Primary author: Prof. FREZZOTTI, Roberto (University of Rome Tor Vergata, Physics Department and INFN - Sezione di Roma Tor Vergata)

Co-authors: Prof. ROSSI, Giancarlo (University of Rome Tor Vergata, Physics Department and INFN, Sezione di Roma Tor Vergata and Centro Fermi, Roma); Dr TANTALO, Nazario (University of Rome Tor Vergata, Physics Department and INFN, Sezione di Roma Tor Vergata)

Presenter: Prof. FREZZOTTI, Roberto (University of Rome Tor Vergata, Physics Department and INFN - Sezione di Roma Tor Vergata)

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