

QCD+QED PDFs in HERAFitter

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Implementation of QEDevol in HERAFitter

- The combined QCD+QED evolution is realized with QEDevol package which is based on coupled DGLAP evolution toolbox implemented in beta version of QCDNUM. The results were crosschecked with APFEL for NNLO QCD + LO QED evolution in VFNS.
- Since HERAFitter structure is based on the functionality of the standard QCDNUM program, I decide to implement the QCD+QED evolution via PDFINP subroutine, i.e. the QED-modified PDFs are treated by QCDNUM as external PDF (similar to APFEL implementation).
- This way we can fit gluon and quark PDFs with QED-corrections, but not directly the photon PDF (at the moment $\gamma(x, q^2) = 0$ at initial scale $q^2 = q_0^2$)
- The subroutine QEDEVOL(x, qmu2, xf) performs the evolution

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- `QEDEVOL(x, qmu2, xf)` contains calls of `EVDGLAP` for evolution and `EVPLIST` for interpolation. For a given initial parametrization the evolved PDFs are saved to disk using `DUMPTAB` routine after the first call of `QEDEVOL`. For the later calls the evolution is skipped and `READTAB` is used.
- The full implementation of QED-modified PDFs (including photon PDF) requires more modifications of HERAFitter. It should be done in a way that does not rely on singlet/non-singlet decomposition of internal PDFs in `QCDNUM`