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Direct Measurement and Renormalisation of Quark and Gluon Momentum Fractions in the Quenched Approximation

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With upcoming Electron-Ion Colliders, such as the eRHIC at Brookhaven National Laboratory and a proposed upgrade to the LHC, the structure of the hadron from both the quark and gluon sectors is quickly becoming a readily accessible frontier in physical investigation. Such experiments are underpinned by a strong theoretical foundation, such as that provided by lattice QCD.

We will show progress in work by the QCDSF/UKQCD/CSSM collaboration to directly measure both quark and gluon momentum fractions in the quenched approximation, and obtain renormalisation factors to match such measurements onto phenomenological quantities in a typical scheme, such as MSbar. The necessary renormalisation matrix describing the mixing between quark and gluon contributions is constructed non-perturbatively, with the off-diagonal component obtained through mixed amputated vertex functions applied in an RI-MOM scheme. The measurements in the gluon sector make use of the Feynman-Hellmann method, to extract statistically significant signals from typically noisy gluon singlet operators.

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