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Normalised Multi-jet Cross Sections using Regularised Unfolding and Extractions of $\alpha_s(M_Z)$ in Deep-Inelastic Scattering at high Q^2 at HERA

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New results on normalised inclusive jet, di-jet and trijet differential cross sections in neutral current deep-inelastic ep scattering (DIS) based on a regularised unfolding procedure are presented. Detector effects like acceptance and migrations as well as statistical correlations between the multi-jets and the inclusive DIS events are taken into account in this procedure. The DIS phase space of this measurement with the H1 detector is given by the virtuality of the exchanged boson (γ^*, Z^0) $150 < Q^2 < 15000 \text{ GeV}^2$ and the inelasticity of the interaction $0.2 < y < 0.7$. The jets are reconstructed in the Breit frame of reference using the k_t jet algorithm. In all cases the jet pseudorapidities in the laboratory frame are required to be in the range $-1.0 < \eta_{\text{lab}} < 2.5$. For inclusive jets the transverse momenta in the Breit frame are required to be $7 < P_T < 50 \text{ GeV}$. The di-jet and tri-jet phase space are defined by requiring $5 < P_{T,i} < 50 \text{ GeV}$, and the invariant mass of the two leading jets $M_{1,2} > 16 \text{ GeV}$. Compared to a previously published result on normalised multi-jet cross sections, the new features are an extended range in jet pseudorapidity, an improved hadronic energy scale uncertainty of 1% and the adoption of a regularised unfolding procedure. The unfolded normalised jet cross sections are compared to QCD calculations at NLO and values for the strong coupling $\alpha_s(M_Z)$ are extracted.

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