Abstract Registration Number 527
Parallel sessions: 3
Plenary sessions: 5

Multi-Jet Event Rates in Deep-Inelastic Scattering and Determination of the Strong Coupling Constant

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Jet event rates in deep inelastic ep scattering at HERA are investigated applying the modified JADE jet algorithm. The analysis uses data taken with the H1 detector in 1994 and 1995. The data are corrected for detector and hadronization effects and then compared with pertubative QCD predictions using next-to-leading order calculations. The strong coupling constant $\alpha_s(M_Z^2)$ is determined evaluating the jet event rates. Values of $\alpha_s(Q^2)$ are extracted in four different bins of the negative squared momentum transfer Q^2 in the range from 40 GeV^2 to 4000 GeV^2. A combined fit of the renormalization group equation to these several $\alpha_s(Q^2)$ values results in $\alpha_s(M_Z^2) = 0.117 \pm 0.003\,(stat)\,^{+0.009}_{-0.013}\,(sys)\; + 0.006\,(recombination\ scheme)$.