H1prelim-01-072

Beauty Production in Deep Inelastic Scattering

We present the first measurement of beauty production in DIS. The analysis is performed with a sample of DIS events with 2 jets ($E_T > 5$ GeV) accompanied by a muon which is identified in the instrumented iron and well measured in the central silicon vertex detector. The contribution of $b\bar{b}$ events to the sample is determined with a likelihood fit to the two-dimensional distribution in the impact parameter δ and the transverse momentum p_T^{rel} relative to the jet axis, as applied previously in the photoproduction regime.[1] For the DIS sample of 168 events, it yields a $b\bar{b}$ fraction of $f_b = (43 \pm 8)\,\%$. The cross section in the visible range
$2 < Q^2 < 100$ GeV^2, $0.05 < y < 0.7$, $p_T(\mu) > 2$ GeV and $35° < \theta(\mu) < 130°$.
is found to be

$$\sigma_{vis}(ep \to b(\bar{b})e'X \to \mu X) = [\ 39\ \pm\ 8\ (stat.)\ \pm 10\ (syst.)\,]\ \mathrm{pb}\ .$$

A NLO QCD calculation using the HVQDIS program[2] with a Peterson fragmentation function gives (11 ± 2) pb, where the error has been estimated by varying the scale $\mu = \sqrt{Q^2 + 4m_b^2}$ by factors of two, the fragmentation parameter ϵ between 0.0016 and 0.0069, and m_b between 4.5 and 5 GeV. The b mass has the strongest influence ($\pm 11\,\%$). The AROMA LO Monte Carlo[3] prediction is 9 pb. A LO calculation with the CASCADE program based on the CCFM evolution equation[4] yields 15 pb.

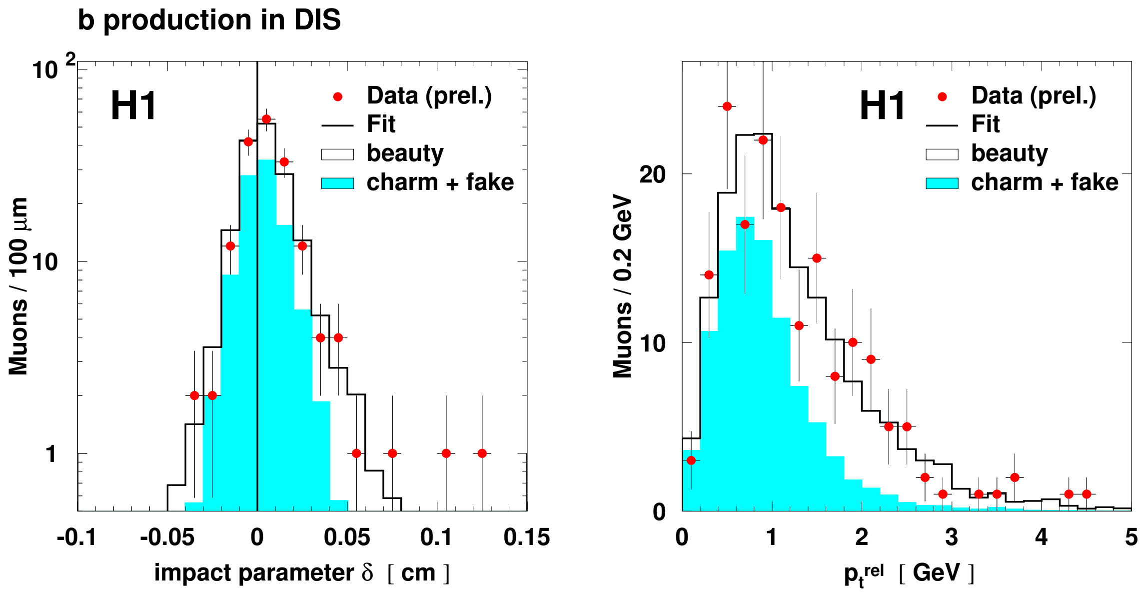

Figure 1: Impact parameter distribution (left), and distribution of transverse momentum relative to the jet axis (right), with decomposition from the likelihood fit.

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[1] F. Sefkow, talk presented at ICHEP 2000, July 2000, and contrib. paper http://www-h1.desy.de/psfiles/confpap/ICHEP2000/H1prelim-00-171.ps

[2] B.W. Harris and J. Smith, Phys. Rev. D57 (1998) 2806.

[3] G. Ingelman, J. Rathsman and G.A. Schuler, Comput. Phys. Commun. 101 (1997) 135

[4] H. Jung, G.P. Salam, *Eur. Phys. J.* **C** (2001) DOI 10.1007/s100520100604, hep-ph/0012143.