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INCLUSIVE JET CROSS-SECTION AND A SEARCH FOR QUARK COMPOSITENESS AT THE CERN $\bar{p}p$ COLLIDER

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Abstract

The inclusive jet cross-section has been measured at the CERN $\bar{p}p$ Collider ($\sqrt{s} = 630$ GeV) as a function of the jet transverse momentum (p_T) and pseudorapidity (η) for p_T values up to 180 GeV and for $-2 < \eta < 2$. The results are consistent with leading order QCD calculations, and a lower limit $\Lambda_C > 825$ GeV (95% C.L.) is set on the quark compositeness scale Λ_C .

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1. INTRODUCTION

Jet physics has become a major field of interest at high energy hadron colliders ever since the early observation at the CERN $\bar{p}p$ Collider that events with large transverse energy are dominated by unambiguous two-jet production [1]. Extensive studies have focused on inclusive jet cross-section measurements, on the dynamics of the production processes, on fragmentation properties of hadronic jets, and on multi-jet production [2]. So far all results strongly support an interpretation in terms of hard scattering of quarks (anti-quarks) and gluons as described by Quantum Chromodynamics (QCD), with the outgoing partons fragmenting into jets of final state hadrons. Deviations from the QCD predictions could be due to physics beyond the Standard Model. It is particularly interesting to examine the behaviour of the inclusive jet cross-section at very large transverse momenta, p_T , where effects of a hypothetical quark substructure (compositeness) could become visible [3].

In this Letter new results are reported on the inclusive jet cross-section at the CERN $\bar{p}p$ Collider ($\sqrt{s} = 630$ GeV) from a large data sample with an integrated luminosity of 7.5 pb^{-1} , corresponding to more than a factor 20 increase with respect to the previous UA2 measurement [4]. Exploiting the extended coverage in pseudorapidity, η , of the upgraded UA2 detector [5] the η -dependence of the cross-section is given for the range $-2 < \eta < 2$.

The detector elements relevant to jet studies and the data taking procedure are briefly described in Section 2. The jet identification criteria and the cross-section results are given in Section 3. A comparison with QCD and a limit on the compositeness scale are discussed in Section 4.

2. APPARATUS AND DATA TAKING

The UA2 experiment was considerably upgraded and rebuilt [5] during the period 1985 to 1987. Jet identification and energy measurements are provided by Pb - and Fe - scintillator calorimetry for which full azimuthal coverage has been extended to a pseudorapidity range of $-3 < \eta < 3$. The calorimeter is divided into a central part (CC) within $|\eta| < 1$ and two end cap (EC) regions reaching $|\eta| \leq 3$. Granularity is provided by segmentation into 624 cells pointing approximately towards the interaction region. The 240 CC cells subtend each 10° in polar angle θ and 15° in azimuthal angle ϕ . The EC cells have a segmentation of $\Delta\phi = 15^\circ$, $\Delta\eta = 0.2$ in the range $1.0 < |\eta| < 2.2$. The cells closest to the beam axis ($2.2 < |\eta| < 2.5$ and $2.5 < |\eta| < 3.0$) cover 30° in ϕ . In the CC, each cell is divided into an electromagnetic (EM)

section and two hadronic sections adding up to a total thickness of 4.5 absorption lengths, λ . The EC cells with $1.0 < |\eta| < 2.5$ have one EM and one hadronic section with a total thickness of 6.5λ or more depending on θ . Only a hadronic section exists for the cells with $2.5 < |\eta| < 3.0$ as well as for additional cells ($0.9 < |\eta| < 1.0$) overlapping with the edge cells of CC in order to measure particles escaping from the interface between CC and EC. Further details on the layout of the calorimeters can be found in Ref. [6].

The initial absolute calibration of the calorimeters was obtained by exposing every cell to beams of electrons, pions and muons of known momenta. The calibration stability has been monitored by measuring the calorimeter response to radioactive sources (Co^{60}). The accuracy of this relative response monitoring has been measured by periodic recalibrations of a part of the calorimeter using test beams. The uncertainty on the absolute calibration is determined to be $\pm 1\%$ for the electromagnetic energy scale and $\pm 2\%$ for the hadronic energy scale. Since hadronic jets deposit typically one half of their energy in the electromagnetic section, the calibration uncertainty on the absolute energy scale is $\pm 1.5\%$. The relative calibration uncertainty between CC and EC modules is estimated to be less than 1.5%.

To optimize the energy resolution for single charged pions, relative weight factors are defined for all sections in order to compensate (on average) for the different calorimeter response to hadrons and photons. The calorimeter weights applied to the electromagnetic cells are 1.18 in the central calorimeter and 1.2 in the end caps. An additional weight of 1.06 is applied to the second hadronic section of the central calorimeter to account for hadronic energy leaking through the back of the calorimeter. The energy resolution σ_E/E for single pions varies for the CC from 32% at 1 GeV to 11% at 70 GeV, approximately proportional to $E^{-1/4}$ (where E is measured in GeV), whereas for the EC it can be described as $68\% E^{-1/2}$ for E below 25 GeV and $30\% E^{-1/4}$ above.

The calibration procedure ensures a correct energy measurement for particles with momenta equal to those of the calibration beam. Since a jet fragment typically carries a small fraction of the parent parton momentum, jet energy measurements are sensitive to deviations from calorimeter linearity at low momenta. Test beam measurements performed with the EC calorimeter have shown non-linearities at very low hadron momenta (< 1 GeV). For example, only 70% of the total energy of a charged pion with a momentum of 200 MeV is measured in the calorimeter. The test beam results are well reproduced by simulations of hadronic showers based on

Ref. [7]. This justifies the use of such simulation programs for the central calorimeter where no such low momentum beam measurements are available.

In addition to the calorimetric information a knowledge of the longitudinal position of the interaction vertex is required. Tracking information has not been recorded for the high rate jet trigger described below in order to keep the read-out time and the event size small. Instead, the position of the interaction vertex is measured by using the information from two time-of-flight (TOF) hodoscopes covering the interval $2.3 < |\eta| < 4.1$. These hodoscopes, consisting of 20 counters on each side at a distance of 120 cm from the centre of the detector, give a coincidence signal from both sides of the interaction region for about 98% of hard inelastic $\bar{p}p$ interactions. For a single counter the particle time-of-flight from the interaction vertex to the TOF array is measured with an accuracy of about 0.3 ns (r.m.s.). This results in a vertex determination along the beam axis with a r.m.s. precision of 2.5 cm based on the difference between the arrival times of particles on the two sides.

The data presented here have been recorded during the 1988 and 1989 CERN $\bar{p}p$ Collider runs at $\sqrt{s} = 630$ GeV. At the lowest (analogue) trigger level a total transverse energy deposition $E_T \geq 25$ GeV was required in any 60° azimuthal wedge extending over the range $-2 < \eta < 2$. This requirement is refined at the next trigger level using a clustering algorithm based on fast digitisation [8] of individual cell energies. Finally, the full calorimeter information is available at the third trigger level where events have been required to contain at least one jet cluster (as defined in the next Section) having $E_T > 40$ GeV. In addition, a coincidence signal from the two TOF arrays has been used for part of the data to suppress background events due to beam-halo interactions.

The integrated luminosity $\mathcal{L}$, needed for the absolute cross-section normalization, has been measured using eight scintillator telescopes at small angles to the beams, four on each side of the detector, as described in Ref. [9]. The data presented in this Letter correspond to $\mathcal{L} = 7.54 \pm 0.37 \text{ pb}^{-1}$ for $E_T > 60$ GeV whereas only a partial data sample ($\mathcal{L} = 1.08 \pm 0.06 \text{ pb}^{-1}$) was used for $40 \text{ GeV} < E_T < 60 \text{ GeV}$.

3. JET IDENTIFICATION AND CROSS-SECTION

Jets are identified through their energy deposition pattern in the calorimeter according to the following algorithm. Adjacent cells with $E_T > 400$ MeV are joined into clusters. Only clusters with $E_T > 3$ GeV are retained. In order to take into account

final-state gluon radiation, clusters within a cone of radius $r = (\Delta\phi^2 + \Delta\eta^2)^{1/2} = 1.3$ in the ϕ - η space (ϕ in radians) around the highest energy cluster are merged. The axis is defined by the interaction vertex and the cluster energy centroid. The same procedure is applied for the remaining clusters. In the final jet definition the transverse energy of all clusters inside the cone is collected (scalar sum), while the jet direction is given by the vector pointing from the event vertex to the energy centroid of all clusters in the cone.

Owing to the loose trigger condition, the data sample contains a small ($< 3\%$) background contamination caused by accidental overlaps of beam-halo particles with real $\bar{p}p$ collisions. Events are therefore rejected in the data analysis with the following criteria if they show energy deposition patterns typical of particles entering the calorimeter from outside. This background is negligible for all jet E_T once it is required that the total energy in the calorimeters be less than 630 GeV, that the jet energy fraction deposited in the EM sections be between 3 and 97%, and that there exists at least one more jet in the event with $|\eta| < 3$ and a transverse energy in excess of 10% of the highest E_T jet. Furthermore, events are required to have a reconstructed TOF vertex along the beam axis within ± 50 cm from the centre of the detector.

The data have been divided into five equidistant $|\eta|$ intervals over the range $0 < |\eta| < 2$. This corresponds to the fiducial region of well contained jets in the UA2 calorimeter. In addition the data within the fiducial region of the CC alone ($0 < |\eta| < 0.85$) have also been analysed separately.

For the determination of the cross-section, the acceptance corrections have been calculated as a function of jet η and E_T through a complete Monte Carlo simulation. The simulation takes into account the detailed calorimeter response as parameterized from extensive test beam data, the efficiency of the jet reconstruction algorithm, and the effects due to hadronization including the contributions from the underlying spectator event to the measured jet energy. Events have been simulated using the generator of Ref. [10] and the fragmentation scheme according to Ref. [11], and have then been analysed with the same algorithms as the real data. This procedure allows one to correlate the observed jet E_T to the parton transverse momentum p_T and to estimate the systematic uncertainties of the acceptance corrections, including analysis and reconstruction parameters like the jet cone radius r .

The largest contribution to the p_T -dependent systematic uncertainty is caused by the limited knowledge of the underlying spectator event which can increase the measured jet E_T . This effect has been estimated by examining the energy deposition

outside the jet cones in real data and Monte Carlo generated events. The parameters modelling the underlying event in the generator of Ref. [10] have been adjusted in order to reproduce measured energy distributions [12]. An uncertainty of about 0.9 GeV remains for the jet E_T scale due to the underlying event corrections, introducing a cross-section uncertainty of typically $\pm 10\%$ at $p_T = 60$ GeV and of $\pm 5\%$ at 130 GeV. Further, small p_T -dependent systematic errors arise from variations in the acceptance corrections and from residual efficiency uncertainties close to the trigger threshold at low jet E_T .

Several uncertainties have been added in quadrature resulting in a $\pm 32\%$ systematic scale error on the cross-sections which is dominated by a $\pm 25\%$ contribution from the model dependence of the acceptance correction calculations. The latter include the spread of the results for several fragmentation schemes [11] and widely varying fragmentation functions [13]. Uncertainties due to the analysis parameters and the jet algorithm amount to less than $\pm 15\%$. Other small effects have been investigated by repeating both the data analysis and the Monte Carlo correction procedures for various alternative choices: for example, using (θ, ϕ) - space instead of (η, ϕ) , E instead of E_T , applying no vertex corrections, varying the jet cone radius r . Finally, the systematic uncertainties of the absolute calorimeter energy scale and the error on the integrated luminosity contribute $\pm 11\%$ and $\pm 5\%$ respectively.

The inclusive jet cross-sections $d^2\sigma/dp_T d\eta$ are listed in Tables 1 and 2 separately for the different $|\eta|$ bins and averaged over the central region. Figures 1 and 2 display the corresponding data. The errors combine in quadrature both statistical and p_T -dependent systematic uncertainties. The statistical errors dominate only at high p_T values. The additional systematic cross-section scale uncertainty is $\pm 32\%$.

In the region of overlap the inclusive jet cross-section for the central region (Table 2 and Fig. 2), is in good agreement with the previous UA2 measurement [4]. The present values lie about 20% above the old ones, but are well within the combined scale uncertainties. They also agree with the results of UA1 [14] given the quoted systematic errors. The present data extend the measured p_T range at $\sqrt{s} = 630$ GeV up to 180 GeV.

The scale invariant jet cross-sections $p_T^4 E d\sigma/dp^3$ for the central region covers the range $0.14 < x_T < 0.51$ in the scaling variable $x_T = 2p_T/\sqrt{s}$. Scale breaking effects between the CERN $\bar{p}p$ Collider and the lower ISR energies have been reported previously by UA2 [4]. This analysis has been repeated with the published data from CDF [15] at $\sqrt{s} = 1.8$ TeV. The systematic errors are sufficiently small to allow one to

establish scale breaking between the jet data from the CERN and FNAL $\bar{p}p$ Colliders alone. A computation assuming that $p_T^4 E d\sigma/dp^3$ depends only on x_T over the region of overlap (exact scaling) gives a χ^2 of 15.7 for 6 degrees of freedom (d.f.) whereas a good fit for all data ($\chi^2/\text{d.f.} = 67.8/53$) is obtained for $E d\sigma/dp^3 \propto p_T^{-n} (1 - x_T)^m/x_T^2$ with $n = 4.92 \pm 0.11$ and $m = 6.04 \pm 0.28$.

4. COMPARISON WITH QCD AND A LOWER LIMIT ON THE COMPOSITENESS SCALE

A leading order QCD calculation, $O(\alpha_s^2)$, in the strong coupling α_s is compared to the data in Figs. 1 and 2. This absolute cross-section calculation uses the structure function parametrization of Ref. [16] and a momentum transfer scale chosen as $Q^2 = (p_T/2)^2$. The agreement with the experimental data is good for central values of η , both in terms of the p_T -dependence and of the absolute cross-section values. Only a marginal agreement is observed at increasing values of $|\eta|$, reaching differences of almost a factor of two for the highest bin $1.6 < |\eta| < 2.0$. However the predictions with different sets of structure functions [17] vary in this η region by more than 30% at $p_T = 100$ GeV when normalized to the one of Ref. [16] at $\eta = 0$. No systematic effect has been identified in the data which could explain a possible underestimate of the cross-sections. In particular, calibration and response correction differences between the CC and EC calorimeters are estimated to introduce relative cross-section scale errors between them of less than $\pm 20\%$.

The results with several different sets of structure functions [17] are shown in Fig. 3 where the data at central rapidities as well as the QCD predictions are displayed as ratios to the above calculation. All results are shown for $Q^2 = (p_T/2)^2$ which gives the best description of the experimental data for most cases.

Recently, next-to-leading order calculations, $O(\alpha_s^3)$, have become available [18]. They cannot be compared directly to the data because the fragmentation corrections are not known for the present jet algorithm which minimizes the influence of the underlying spectator event. However it is interesting to note that the inclusion of $O(\alpha_s^3)$ contributions only slightly modifies the shape of the cross-sections at the parton level with respect to the $O(\alpha_s^2)$ calculation, raising it by about 10% at $p_T = 180$ GeV.

It has been pointed out by Ref. [3] that the effects of a hypothetical super-strong interaction binding preons inside the quarks could result in deviations from the QCD behaviour, particularly at very large p_T . The QCD calculations have been modified following the parametrization of Ref. [3]. In this model, compositeness of

quarks would manifest itself as a contact interaction already visible at momentum transfers well below the characteristic energy scale Λ_C describing the strength of the new interaction. Finite values of Λ_C would produce an excess of events at large p_T with respect to the standard QCD prediction, which corresponds to $\Lambda_C = \infty$. In the following calculations, the usual choice $g^2/4\pi = 1$ has been made for the coupling constant whereas the most pessimistic assumption has been taken for the phase governing the interference terms between QCD and the new interaction (see Refs. [3,16] for details).

The calculations have been normalized by a factor F to the experimental data over the range $69 \text{ GeV} < p_T < 79 \text{ GeV}$ where the pure QCD contribution is expected to dominate. Only the cross-section data for central values of η have been used, as these data extend furthest in p_T and are expected to be most sensitive to the contact interaction. The calculations have been performed with all structure function parametrizations shown in Fig. 3. However, only the one of Ref. [16], leading to the smallest bound on Λ_C , has been retained. Also the choice of the Q^2 scale affects the shape and the normalization of the cross-section predictions. For the determination of Λ_C , the Q^2 scale has been varied within the range $(p_T^2/12 < Q^2 < p_T^2/2)$ corresponding to normalisation values F compatible with the overall systematic uncertainty of the cross-section measurement. The best fit for the structure functions of Ref. [16] is obtained in absence of a contact interaction ($\Lambda_C = \infty$) with a normalization $F = 1.00 \pm 0.04$ and a scale $Q^2 = (p_T/2)^2$ yielding a χ^2 of 23.1 for 19 d.f.. The 95% confidence level (CL) lower limit on Λ_C corresponds to 845 GeV. Conservatively both statistical and p_T -dependent errors, ignoring possible correlations, are included in the latter calculation.

The data and the expected behaviour for various values of Λ_C are displayed in Fig. 4 normalized to the reference QCD calculation. Systematic effects have been investigated which could distort the cross-section shape such as to lower the limit on Λ_C . The most important one is the calorimeter energy scale uncertainty which in the most pessimistic case reduces the 95% CL limit to the final result $\Lambda_C > 825 \text{ GeV}$. Other effects investigated, such as the use of a finer binning at large p_T or an approximate correction for next-to-leading order QCD contributions, result in an increased limit.

The present limit on Λ_C represents a significant improvement over previous limits from the CERN $\bar{p}p$ Collider [4,19] and over the published limit from CDF [15] based on an early small data sample. Higher limits are expected to be reached at the FNAL Collider at $\sqrt{s} = 1.8 \text{ TeV}$ [20].

In summary, the inclusive jet cross-section and its rapidity dependence have been measured at the CERN $\bar{p}p$ Collider at $\sqrt{s} = 630$ GeV with the upgraded UA2 experiment. Whereas the data are very well described by leading order QCD calculations for central rapidities, only a marginal agreement is observed for $|\eta| \approx 2$. The data have been used to extract a new lower limit of 825 GeV (95% CL) for the energy scale Λ_c associated with a possible quark compositeness.

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TABLE CAPTIONS

- Table 1 Inclusive jet cross-section $d^2\sigma/dp_T d\eta$ in [pb / GeV] for different intervals of pseudorapidity η . The quoted errors include statistical and p_T -dependent systematic uncertainties added in quadrature. In addition, there is a systematic scale uncertainty of $\pm 32\%$.
- Table 2 Inclusive jet cross-section $d^2\sigma/dp_T d\eta$ in [pb / GeV] for the central region ($0 < |\eta| < 0.85$). The quoted errors include statistical and p_T -dependent systematic uncertainties added in quadrature. In addition, there is a systematic scale uncertainty of $\pm 32\%$.

PT	ΔP_T	$0. < \eta < 0.4$	$0.4 < \eta < 0.8$	$0.8 < \eta < 1.2$	$1.2 < \eta < 1.6$	$1.6 < \eta < 2.0$
45.	2.	0.779E+4±0.117E+4	0.683E+4±0.103E+4	0.444E+4±0.670E+3	0.253E+4±0.382E+3	0.867E+3±0.134E+3
47.	2.	0.605E+4±0.868E+3	0.516E+4±0.741E+3	0.333E+4±0.480E+3	0.180E+4±0.260E+3	0.557E+3±0.829E+2
49.	2.	0.473E+4±0.661E+3	0.400E+4±0.560E+3	0.254E+4±0.357E+3	0.138E+4±0.195E+3	0.349E+3±0.518E+2
51.	2.	0.369E+4±0.511E+3	0.307E+4±0.426E+3	0.203E+4±0.284E+3	0.101E+4±0.142E+3	0.227E+3±0.343E+2
53.	2.	0.273E+4±0.376E+3	0.229E+4±0.316E+3	0.158E+4±0.219E+3	0.736E+3±0.104E+3	0.172E+3±0.264E+2
55.	2.	0.220E+4±0.318E+3	0.177E+4±0.257E+3	0.115E+4±0.168E+3	0.501E+3±0.747E+2	0.961E+2±0.163E+2
57.	2.	0.177E+4±0.330E+3	0.138E+4±0.258E+3	0.912E+3±0.172E+3	0.359E+3±0.689E+2	0.681E+2±0.146E+2
59.	2.	0.133E+4±0.238E+3	0.103E+4±0.185E+3	0.661E+3±0.120E+3	0.232E+3±0.435E+2	0.423E+2±0.931E+1
61.	2.	0.110E+4±0.140E+3	0.815E+3±0.105E+3	0.518E+3±0.680E+2	0.216E+3±0.302E+2	0.208E+2±0.457E+1
63.	2.	0.837E+3±0.883E+2	0.633E+3±0.669E+2	0.349E+3±0.374E+2	0.133E+3±0.145E+2	0.174E+2±0.225E+1
65.	2.	0.692E+3±0.707E+2	0.513E+3±0.526E+2	0.284E+3±0.296E+2	0.972E+2±0.104E+2	0.101E+2±0.140E+1
67.	2.	0.563E+3±0.559E+2	0.425E+3±0.424E+2	0.216E+3±0.220E+2	0.784E+2±0.827E+1	0.648E+1±0.978E+0
69.	2.	0.457E+3±0.441E+2	0.341E+3±0.331E+2	0.182E+3±0.181E+2	0.565E+2±0.595E+1	0.373E+1±0.648E+0
71.	2.	0.367E+3±0.345E+2	0.262E+3±0.249E+2	0.142E+3±0.139E+2	0.450E+2±0.472E+1	0.241E+1±0.475E+0
73.	2.	0.301E+3±0.276E+2	0.222E+3±0.206E+2	0.112E+3±0.108E+2	0.295E+2±0.319E+1	0.116E+1±0.299E+0
75.	2.	0.243E+3±0.218E+2	0.182E+3±0.166E+2	0.848E+2±0.807E+1	0.219E+2±0.244E+1	0.699E+0±0.217E+0
77.	2.	0.192E+3±0.169E+2	0.146E+3±0.131E+2	0.648E+2±0.615E+1	0.169E+2±0.194E+1	0.642E+0±0.200E+0
79.	2.	0.155E+3±0.134E+2	0.118E+3±0.104E+2	0.539E+2±0.509E+1	0.156E+2±0.179E+1	0.549E+0±0.178E+0
81.	2.	0.123E+3±0.105E+2	0.946E+2±0.830E+1	0.432E+2±0.409E+1	0.948E+1±0.122E+1	0.302E+0±0.124E+0
83.	2.	0.111E+3±0.933E+1	0.777E+2±0.679E+1	0.330E+2±0.318E+1	0.683E+1±0.957E+0	
84.	4.					0.890E-1±0.446E-1
85.	2.	0.861E+2±0.722E+1	0.648E+2±0.565E+1	0.271E+2±0.265E+1	0.465E+1±0.735E+0	
87.	2.	0.705E+2±0.590E+1	0.541E+2±0.473E+1	0.201E+2±0.205E+1	0.362E+1±0.620E+0	0.919E-1±0.418E-1
88.	4.					0.299E-1±0.211E-1
89.	2.	0.591E+2±0.495E+1	0.401E+2±0.360E+1	0.165E+2±0.173E+1	0.331E+1±0.579E+0	
92.	4.	0.454E+2±0.354E+1	0.325E+2±0.266E+1	0.113E+2±0.108E+1	0.125E+1±0.239E+0	
96.	4.	0.309E+2±0.242E+1	0.209E+2±0.176E+1	0.718E+1±0.742E+0	0.602E+0±0.154E+0	
100.	4.	0.230E+2±0.181E+1	0.137E+2±0.122E+1	0.462E+1±0.526E+0	0.485E+0±0.131E+0	
104.	4.	0.145E+2±0.121E+1	0.862E+1±0.843E+0	0.305E+1±0.386E+0	0.189E+0±0.771E-1	
108.	4.	0.104E+2±0.117E+1	0.775E+1±0.938E+0	0.179E+1±0.295E+0	0.142E+0±0.644E-1	0.349E-3±0.913E-3
114.	10.	0.597E+1±0.668E+0	0.227E+1±0.343E+0	0.956E+0±0.145E+0	0.497E-1±0.223E-1	
124.	10.	0.255E+1±0.360E+0	0.117E+1±0.196E+0	0.371E+0±0.755E-1		
138.	20.	0.715E+0±0.126E+0	0.346E+0±0.715E-1	0.617E-1±0.175E-1		
131.	30.				0.325E-2±0.231E-2	
162.	30.	0.807E-1±0.283E-1	0.196E-1±0.102E-1	0.266E-2±0.175E-2		
189.	20.			0.121E-3±0.368E-3		

Table 1

p_T	Δp_T	$(d^2\sigma/dp_T d\eta)$ [pb/GeV]
45.	2.	$0.765E+4 \pm 0.115E+4$
47.	2.	$0.580E+4 \pm 0.830E+3$
49.	2.	$0.448E+4 \pm 0.624E+3$
51.	2.	$0.344E+4 \pm 0.474E+3$
53.	2.	$0.255E+4 \pm 0.349E+3$
55.	2.	$0.199E+4 \pm 0.285E+3$
57.	2.	$0.156E+4 \pm 0.291E+3$
59.	2.	$0.118E+4 \pm 0.209E+3$
61.	2.	$0.934E+3 \pm 0.118E+3$
63.	2.	$0.713E+3 \pm 0.752E+2$
65.	2.	$0.584E+3 \pm 0.597E+2$
67.	2.	$0.475E+3 \pm 0.472E+2$
69.	2.	$0.381E+3 \pm 0.369E+2$
71.	2.	$0.300E+3 \pm 0.283E+2$
73.	2.	$0.247E+3 \pm 0.228E+2$
75.	2.	$0.200E+3 \pm 0.181E+2$
77.	2.	$0.160E+3 \pm 0.142E+2$
79.	2.	$0.128E+3 \pm 0.112E+2$
81.	2.	$0.101E+3 \pm 0.868E+1$
83.	2.	$0.877E+2 \pm 0.741E+1$
85.	2.	$0.708E+2 \pm 0.592E+1$
87.	2.	$0.579E+2 \pm 0.480E+1$
89.	2.	$0.464E+2 \pm 0.384E+1$
92.	4.	$0.363E+2 \pm 0.284E+1$
96.	4.	$0.240E+2 \pm 0.187E+1$
100.	4.	$0.173E+2 \pm 0.135E+1$
104.	4.	$0.109E+2 \pm 0.872E+0$
108.	4.	$0.858E+1 \pm 0.919E+0$
114.	10.	$0.421E+1 \pm 0.464E+0$
124.	10.	$0.185E+1 \pm 0.251E+0$
138.	20.	$0.542E+0 \pm 0.915E-1$
162.	30.	$0.528E-1 \pm 0.179E-1$

Table 2

FIGURE CAPTIONS

- Fig. 1 Inclusive jet cross-section $d^2\sigma/dp_T d\eta$ in [pb / GeV] for different bins of pseudorapidity η . The systematic scale uncertainty of $\pm 32\%$ is not shown. The curves represent a QCD $O(\alpha_s^2)$ calculation with $Q^2 = (p_T/2)^2$ using the structure functions of Ref. [16].
- Fig. 2 Inclusive jet cross-section $d^2\sigma/dp_T d\eta$ in [pb / GeV] for the central region ($0 < |\eta| < 0.85$). The systematic scale uncertainty of $\pm 32\%$ is not shown. The curve represents a QCD $O(\alpha_s^2)$ calculation with $Q^2 = (p_T/2)^2$ using the structure functions of Ref. [16].
- Fig. 3 The ratio between the inclusive jet cross-section (black dots) for the central region and a QCD calculation performed using the structure functions of Ref. [16]. The curves represent calculations for different structure functions sets [17], also relative to Ref. [16].
- Fig. 4 The ratio between data (black dots) from the central region and the QCD calculation using $\Lambda_c = \infty$, $Q^2 = (p_T/2)^2$, and the structure functions of Ref. [16]. The behaviours predicted for finite values of Λ_c , again relative to the QCD prediction, are shown as solid curves.

Fig. 1

Fig. 2

Fig. 3

Fig. 4