

ANTIPROTON-PROTON BACKWARD ELASTIC SCATTERING
BETWEEN 1.50 AND 2.04 GeV/c

Glasgow-Lausanne-Liverpool-Neuchâtel Collaboration

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(Presented by B. Jayet)

This paper reports preliminary results on the study of 200'000 pictures from the 2 m-CERN bubble chamber, especially scanned for elastic events. It represents half of the total film irradiated in 1970 for the groups of the Liverpool-Glasgow-Paris-Lausanne/Neuchâtel collaboration, at the eight momenta 1.50, 1.56, 1.68, 1.75, 1.80, 1.86, 1.93 and 2.04 GeV/c, in order to study the U-meson region. Results concerning one quarter of the total film, i.e. about 100'000 pictures have already been presented in a communication to the XVI International Conference on High Energy in Chicago, September 1972 ¹⁾. All elastic events, with $0.7 \geq \cos \theta_{cm} \geq -1.0$ have then been searched in three scannings.

In a second stage, a new part of 100'000 pictures have been scanned twice for all events with $0.0 \geq \cos \theta_{cm} \geq -1.0$, and twice again in order to detect events with short or invisible scattered \bar{p} tracks.

Figure 1 presents the differential cross-sections plotted as a function of $\cos \theta_{cm}$, in bins of 0.05. Up to 1.86 GeV/c, the cross-section shows an enhancement in the last two bins, which climbs to about twice the height of the plateau laying between $\cos \theta_{cm} = -0.2$ and -0.8 . This enhancement disappears at the upper two momenta.

Figure 2 shows the variation of the cross-section in the $-0.8 \geq \cos \theta_{cm} \geq -1.0$ class with regard to the total energy in the CM. We have included the results of other experiments ²⁻⁷⁾, mainly those reported by D.G. Falconer ²⁾.

We have tried to represent the differential cross-section as a sum of Legendre polynomials. A good fit is obtained by including polynomials up degree 11, which indicates the presence of angular momenta up to 6.

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We have also fitted our data to the diffraction model of Frahn and Venter⁸⁾, adapted by Daum⁹⁾ to the $\bar{p}p$ case. It has been found necessary to include 8 parameters in the fit, i.e. different opacities, radii and thicknesses for the waves $J = 1 + 1$ and $J = 1 - 1$.

We have made these fits on the data combining two incident momenta, i.e. 1.75 and 1.77 GeV/c (the last momentum comes from the Michigan group experiment²⁾). The results are shown on figure 3.

REFERENCES

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\bar{P} -P BACKWARD ELASTIC

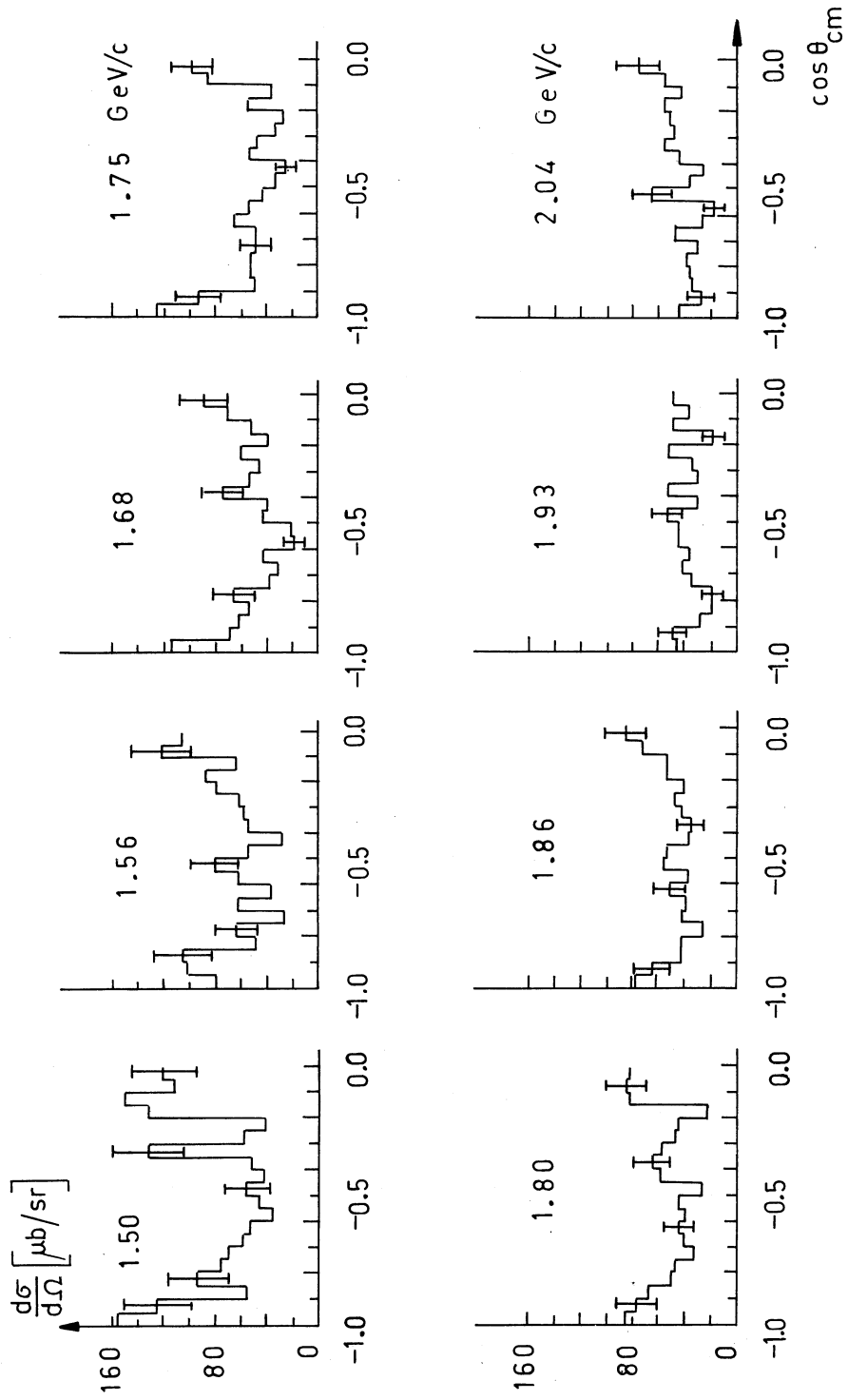


Fig. 1 Differential cross-sections for $0.0 \geq \cos \theta_{\text{cm}} \geq -1.0$ between 1.50 and 2.04 GeV/c

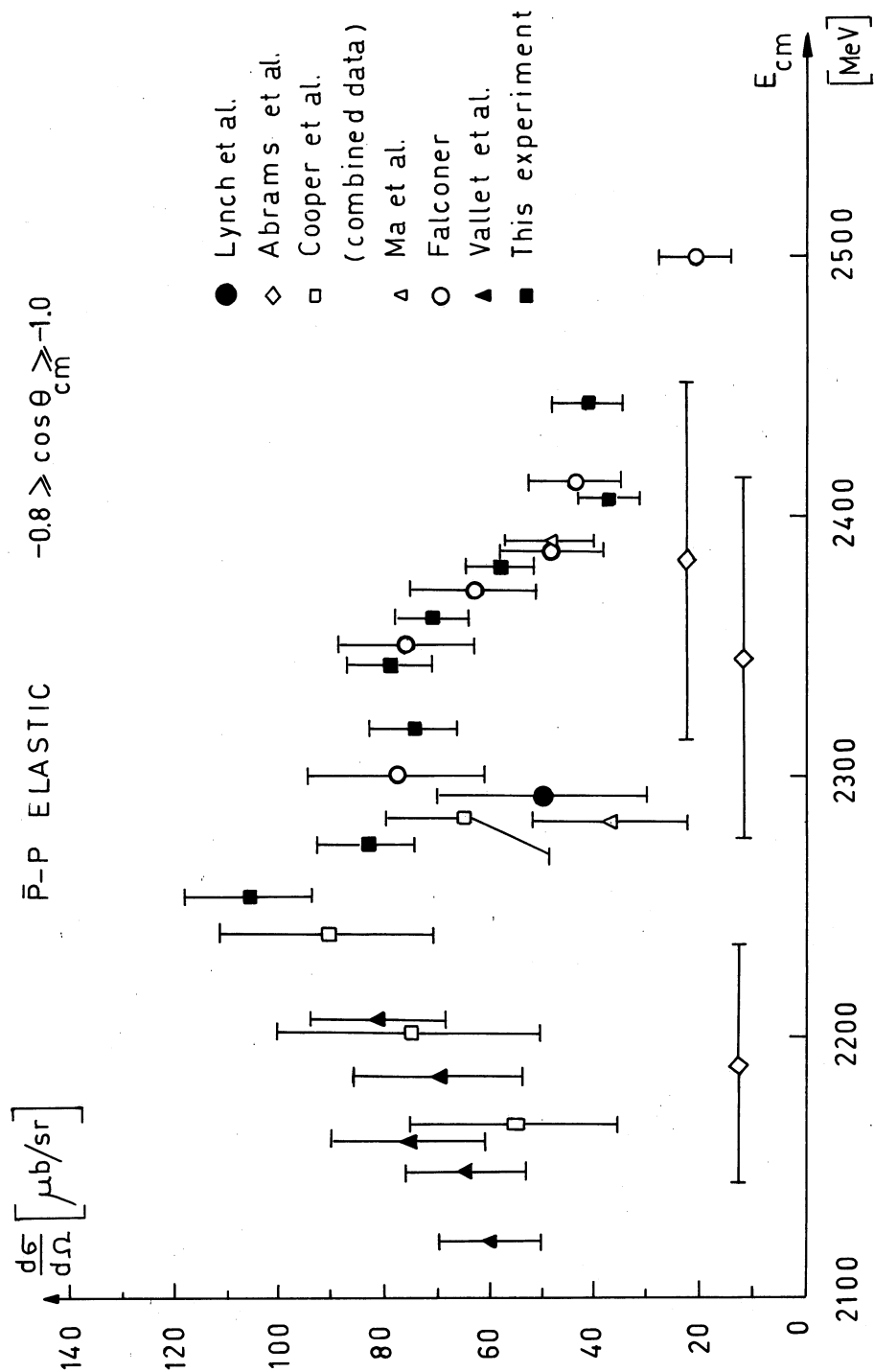


Fig. 2 Differential cross-section for $-0.8 \geq \cos \theta_{cm} \geq -1.0$ plotted as a function of the total energy in the c.m.

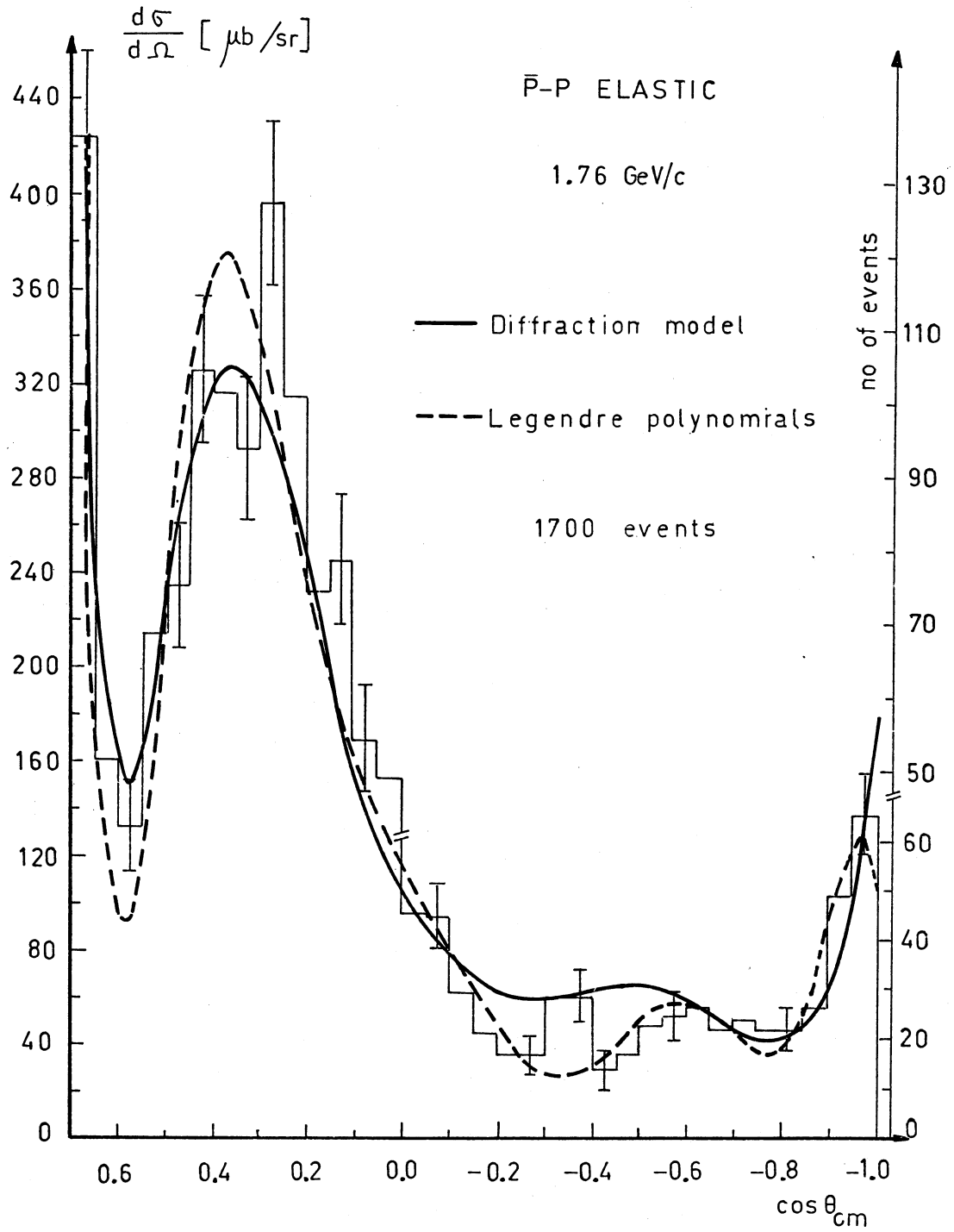


Fig. 3 Fit of the differential cross-section at 1.76 GeV/c by a diffraction model (solid curve) and by a sum of Legendre polynomials (up to P_{11}) (dashed curve)