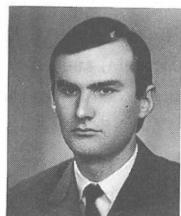


**SEARCH FOR DIFFRACTIVE DISSOCIATION WITH RECOILED PROTON
IN μ^+p AND μ^+d INTERACTIONS AT 490 GEV**

Jan Figiel
Institute of Nuclear Physics,
Kraków, Poland,
for the Fermilab E665 collaboration



Abstract

The category of events with low momentum proton separated from the rest of the hadrons is observed in μ^+p and μ^+d interactions at 490 GeV incident muon energy. Their properties are compatible with these expected for diffractive excitation of the virtual photon on proton target.

In the presented study the recoiled proton detected in muon interactions is used as a signature of diffractive dissociation of the virtual photon.

The samples of $\mu^+ p$ and $\mu^+ d$ interactions obtained by E665 at the Tevatron of Fermilab are used in this analysis ¹⁾. They cover the kinematic region: $Q^2 > 1.0 \text{ GeV}^2$, $8.0 < W < 30.0 \text{ GeV}$, $x_{Bj} > 0.002$. The detector included the streamer chamber which enabled the identification of the low momentum protons by ionisation estimate ($0.2 < p_{lab} < 0.6 \text{ GeV}$, so called "grey" tracks ²⁾).

We consider inclusive diffractive excitation of the virtual photon γ^* on proton target : $\gamma^* p \rightarrow X p'$, where X denotes the hadronic products of the dissociation and p' – the recoiled proton. Following the experience from hadronic interactions ³⁾ the diffractive candidate is defined as an event having slow proton (with Feynman variable $x_F < -0.8$), separated from the rest of charged hadrons by rapidity gap $\Delta y > 2.0$ (see fig. 1a). These conditions were satisfied by $1.2 \pm 0.2\%$ of $\mu^+ p$ interactions (30 events) and $0.8 \pm 0.1\%$ of $\mu^+ d$ ones (46 events) which is consistent with the expectation that on the deuterium the rate should be half of that on proton. The average values of W , Q^2 and x_{Bj} for diffractive subsamples were found to be compatible with those for inclusive samples. The average charged multiplicity of the diffractive system is ~ 4 to be compared with ~ 7 for inclusive samples. No ρ^0 signal is seen in the effective mass distribution of charged hadrons in the diffractive system (fig. 1b). The distribution of squared four-momentum transfer t between the diffractive system and recoiled proton has approximately exponential shape with slope of about -9 (fig. 1c).

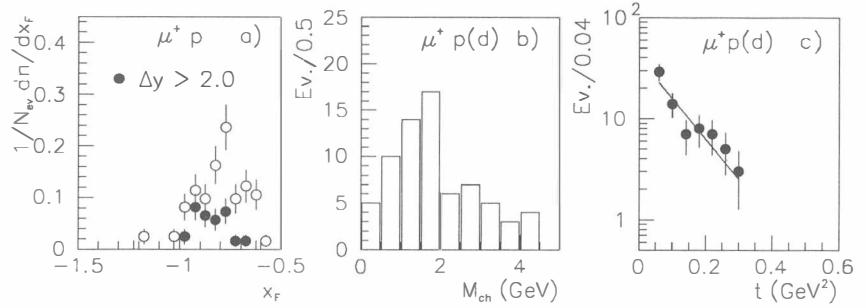


Fig. 1: a) x_F -distribution of protons, b) mass distribution of charged hadrons in the diffractive system, c) t -distribution, line represents exponential fit to the data.

References

1. M. R. Adams et al., Z. Phys. **C61** (1994) 179.
2. M. R. Adams et al., Z. Phys. **C65** (1995) 225.
3. M. Adamus et al., Z. Phys. **C39** (1988) 301.