

BRIEF REPORTS

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Test of limiting fragmentation in ep collisions at DESY HERA

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It is suggested that the hypothesis of limiting fragmentation in (virtual-photon)-proton collisions can be effectively tested at DESY HERA.

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In 1969 the hypothesis of limiting fragmentation was proposed [1] for hadron-hadron collisions. A few years later, this hypothesis was confirmed experimentally by a beautiful test [2] at the Intersecting Storage Rings (ISR) at CERN. We point out here that it seems natural and desirable to do a similar experiment for (virtual-photon)-proton collisions on the ep collider HERA at DESY.

In the CERN experiment, the energy of one proton beam (beam 1) was held fixed, and the ISR was run at several different energies of the other beam (beam 2). The fragmentation of the protons in beam 1 was studied in the laboratory system. The hypothesis of limiting fragmentation states that this fragmentation phenomena is independent of the incoming energy of beam 2, a statement verified by the CERN experiment [2].

With HERA, the arrangement could be simplified. One could fix the energy of both the proton beam and the electron beam. Depending on the outgoing electron's momentum, the virtual photon's four-momentum would

assume different values, and one could study the fragmentation phenomena of the proton beam in the laboratory system for various values of the four-momentum of the virtual photon.

It has been pointed out [3] that for virtual photons very much off the mass shell, i.e., for large values of the parameter $x = q^2/2Mv$, the fragment distribution has to be different from that when x is small. One has, with the two detectors [4] at HERA, a relatively simple way to study this dependence of the fragment distribution on x .

In the CERN experiment, it has been pointed out [2] that fixing the energy of beam 1 and studying the distribution of its fragments avoids troublesome geometrical corrections. This advantage is also obtained for the proposed HERA experiment.

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