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Analysis of Feynman Scaling in Photon and Neutron Production in the Very Forward Direction in Deep-Inelastic Scattering at HERA

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Measurements of the normalised cross sections for the production of photons and neutrons at very small angles with respect to the proton beam direction in deep-inelastic positron proton scattering at HERA are presented as a function of the variable Feynman- x . The data are taken with the H1 detector in the years 2006 and 2007 and correspond to an integrated luminosity of 126 pb^{-1} . The analysis covers the range of negative four momentum transfer squared at the positron vertex $6 < Q^2 < 100 \text{ GeV}^2$, inelasticity $0.05 < y < 0.6$ and the centre-of-mass energy of the virtual photon-proton system $70 < W < 245 \text{ GeV}$. The dependence of the cross sections on W is investigated. Predictions of models of deep inelastic scattering and models of the hadronic interactions of high energy cosmic rays are compared to the measured cross sections.

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