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A review of diffraction at HERA

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Data in which a proton is tagged along the beampipe after the primary interaction represents the cleanest way to measure diffraction. Data from both H1 and ZEUS collaborations on inclusive diffractive deep inelastic scattering, with a tagged proton, have been combined. Inclusive diffractive deep inelastic scattering can be considered as the exchange of a colourless object and is amenable to QCD fits in which the structure of this object, sometimes called a Pomeron, is determined. Given such processes are expected to factorise, such a Pomeron structure can be used to predict the rates of jet production in e.g. diffractive photoproduction. The comparison of jet data with the predictions of next-to-leading order QCD are discussed in the context of factorising breaking. Another way to study diffraction is through the production of vector mesons which is also characterised by a colourless exchange with the proton which in lowest order QCD is realised as a colourless gluon pair. Therefore consideration of the dependence of the J/ψ cross section on the photon-proton centre-of-mass energy is related to the rise of the square of the gluon density towards low values of Bjorken x. Comparisons of HERA data with such theories and other data are presented.

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