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Two-particle azimuthal correlations as a probe of collective behaviour in ep scattering at HERA

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Two-particle azimuthal correlations have been measured in neutral current deep inelastic ep scattering with virtuality $Q^2 > 5$ GeV^2 at a centre-of-mass energy $\sqrt{} = 318$ GeV recorded with the ZEUS detector at HERA. The correlations of charged particles have been measured in the range of laboratory pseudorapidity $-1.5 < \eta < 2.0$ and transverse momentum $0.1 < p_T < 5.0$ GeV and event multiplicities N_{ch} up to six times larger than the average $\langle N_{ch} \rangle$ 5. The two-particle correlations have been measured in terms of the angular observables $c_n 2 = \cos n$, where n is between 1 and 4 and is the relative azimuthal angle between the two particles. Comparisons with available models of deep inelastic scattering, which are tuned to reproduce inclusive particle production, suggest that the measured two-particle correlations are dominated by contributions from multijet production. The dependence of the correlations as a function of Q^2 has also been studied as well as the correlations in photoproduction events ($Q^2 \approx 0$). The correlations observed here do not indicate the kind of collective behaviour recently observed at the highest RHIC and LHC energies in high-multiplicity hadronic collisions.

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