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# Search for longe-range QCD collective phenomena inside high-multiplicity jets in pp collisions with the CMS experiment

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It has been postulated that nonperturbative quantum chromodynamics (QCD) evolution of a single parton in the vacuum can develop long-range collective effects of a multiparton system, reminiscent of those observed in high-energy nuclear interactions from the formation of a quark-gluon plasma. A search for such QCD collective effects is performed by the CMS experiment via correlation measurements of charged constituents inside jets produced in proton-proton collisions. The data set used at $\sqrt{s} = 13$˜TeV corresponds to the full LHC Run-2 sample, with an integrated luminosity of 138˜fb$^{-1}$. For charged constituents within a reconstructed jet of cone radius 0.8, two-particle correlations as functions of relative azimuthal angle ($\Delta\phi*$) and pseudorapidity ($\Delta\eta*$) are performed in a novel "jet frame", where constituent kinematics are re-defined relative to the jet direction being the $z$ axis. The correlation functions are studied in classes of in-jet charged multiplicity up to nearly 100 for different ranges of transverse momentum in the jet frame. Anisotropy Fourier harmonics are extracted from long-range azimuthal correlation functions for $|\Delta\eta*| > 2$. The long-range elliptic anisotropy harmonic in data is compared to Monte Carlo event generators without including any long-range collective effects such as PYTHIA8 and Sherpa.

## Category

Experiment

## Collaboration (if applicable)

CMS

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