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Results from Hydrodynamic Simulations of p+p Collisions at $\sqrt{s} = 7$ TeV[1] RYAN WELLER, PAUL ROMATSCHKE, Univ of Colorado - Boulder
— Relativistic viscous hydrodynamics has been successful in describing the quark-gluon plasma formed in heavy ion collisions at RHIC and the LHC. Recently, experiments on proton-proton collisions at the LHC have provided evidence that high-multiplicity p+p collisions may likewise be amenable to a hydrodynamic description. In order to test such a description, we simulate p+p collisions at $\sqrt{s} = 7$ TeV using the SONIC package, which consists of 2+1-dimensional viscous hydrodynamics followed by a hadron cascade stage. The initial conditions for hydrodynamics are generated using a model which takes into account the fluctuating substructure of the colliding protons. We quantify the effect of proton substructure on measurable quantities such as elliptic flow. Results from the simulations are compared with experimental data from the ATLAS and ALICE experiments at the LHC. In particular, the hydrodynamic approach is shown to reproduce the observed dependence of particle multiplicities on centrality, as well as to provide a reasonable estimate for the elliptic flow v_2 at high multiplicities.

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