

Strong color fields effects and baryon/meson anomaly in p+p and central Pb+Pb collisions at L H C energies(*).

With the HIJING/BBar v2.0 event generator, we explore the phenomenological consequences of the suppression of perturbative quantum chromo-dynamics (pQCD) mini-jet production and of enhanced “in medium” strong longitudinal color field. Nuclear effects like shadowing and parton energy loss (“jet quenching”) are included.

This analysis focuses on p+p collisions at centre of mass energy ($\sqrt{s_{NN}}$) 0.900, 2.36 and 7 TeV, and on central Pb+Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV, where recent data have been reported by LHC Collaborations (ALICE, ATLAS, CMS).

The effective energy-dependent string tension values are constrained by p+p data from Relativistic Heavy Ion Collider (RHIC), the Tevatron, and recent Large Hadron Collider (LHC) runs. The pQCD cut-off value $p_0(s)$ is constrained by Au+Au collisions data from RHIC. Data on charged hadron multiplicity and charged hadron nuclear modification factor (RAA) in central (0-5%) Pb+Pb collisions from the ALICE experiment at the LHC are used to constrain the main parameters of the “jet quenching” phenomena (energy loss and mean free path of initial parton-parton interactions). Predictions for the energy and centrality dependence of rapidity densities ($2dN_{ch}/dy/N_{part}$) and the hadron flavor dependence (mesons and baryons) of the nuclear modification factor RAA are presented. By studying baryon/meson ratios, we show that the jet quenching in central collisions suppresses the hard pQCD component of the particle spectra, thereby exposing a novel component of baryon dynamics that we attribute to (gluonic) baryon-anti-baryon junctions (JJbar). We predict that a baryon/mesons anomaly at intermediate transverse momentum values will persist at LHC energies, with a moderate centrality dependence.

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