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Heavy and light jet quenching in different collision systems at the LHC energies

Recent experiments have observed large anisotropic collective flows in high multiplicity proton-lead collisions at the Large Hadron Collider (LHC), which indicates the possible formation of mini quark-gluon plasma (QGP) in small collision systems.
However, no jet quenching has been confirmed in such small systems so far.
To understand this intriguing result, the system size scan experiments have been proposed to bridge the gap between large and small systems.
In this work, we perform a systematic study on both heavy and light flavor jet quenching in different collision systems at the LHC energies.
The productions of hard jet partons and hadrons are calculated within a next-to-leading-order perturbative QCD framework, the evolution of heavy and light jet partons inside the QGP is simulated via a linearized Boltzmann transport model, and the space-time profile of the QGP fireball is obtained via a (3+1)-dimensional viscous hydrodynamics simulation.
Using our state-of-the-art jet quenching model, we provide a good description of nuclear modification factor R_{AA} for charged hadrons and D mesons in central and mid-central Pb+Pb and Xe+Xe collisions measured by CMS collaboration.
We further predict the transverse momentum and centrality dependences of R_{AA} for charged hadrons, D and B mesons in Pb+Pb, Xe+Xe, Ar+Ar and O+O collisions at the LHC energies.
Our numerical results show a clear system size dependence for both light and heavy flavor hadron R_{AA} across different collision systems.
This study provides a smooth transition for jet quenching from large to small systems, which helps to identify the unique signatures of QGP droplet and search for the disappearance of QGP in relativistic nuclear collisions.

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