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Review of recent Heavy Ion Physics results at the LHC

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Heavy-ion collisions at the Large Hadron Collider (LHC) offer a unique laboratory for probing the quark-gluon plasma (QGP), a novel state of matter believed to have existed shortly after the Big Bang.

This talk will present the latest findings from the LHC, focusing on key observables that shed light on various aspects of the QGP. Heavy-flavor hadrons and jet observables, such as jet quenching and de-correlation, provide crucial insights into the interactions between high-energy partons and the QGP, probing the medium energy density and transport properties. The study of quarkonia suppression and regeneration reveals the binding dynamics of heavy quarks within the plasma, while collective flow patterns offer evidence of the thermalization of the QGP and of collective behavior. Additionally, direct photons serve as penetrating probes, delivering unaltered information from the early stages of the collision, and allowing for the determination of the medium initial temperature and fundamental characteristics.

The talk will also explore emerging similarities between heavy-ion and small-system collisions, contributing to a broader understanding of QGP phenomena. By integrating these diverse findings, this presentation aims to provide a comprehensive overview of the current state of heavy-ion physics research at the LHC.

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