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Probing QGP droplets with charmonium in high-multiplicity proton-proton collisions

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We study the hot medium effects in high-multiplicity proton-proton (pp) collisions at 13 TeV via the charmonium probes. The hot medium is described with the hydrodynamic model, while charmonium evolutions in the medium are studied with a time-dependent Schr¨odinger equation. The hot medium dissociation on charmonium is considered with the temperature-dependent complex potential parametrized with the results from lattice QCD calculations. The ratio ψ(2S)/J/ψ of J/ψ and ψ(2S) production cross sections are calculated and compared with the LHCb experimental data in pp collisions. Our calculations explain the charmonium relative suppression in different transverse momentum and multiplicity bins. The suppression of this ratio is mainly affected by the effects of the deconfined medium. It is less affected by the initial effects before the generation of the heavy quark pair. We suggest this to be a clear signal of the small QGP droplets generated in high multiplicity pp collisions.

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