

Interplay of prompt and non-prompt photons in photon-triggered jet observables

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Prompt photons are important yet challenging to observe in relativistic heavy-ion collisions, as they are produced in the early stages and traverse almost the entire QGP medium without interaction. Experimental analyses typically employ isolation cuts, in the hope to identify prompt photons. Most theoretical studies consider only events with actual prompt photons, assuming no contribution from isolated non-prompt photons to reduce computational cost. For the first time, we present a study that compares simulation results generated using inclusive (bremsstrahlung) and prompt-photon events with multiple experimental observables for both $p - p$ and $Pb - Pb$ collisions at 5.02 TeV.

Simulations are carried out using the multi-stage JETSCAPE framework tuned to describe the quenching of jets and hadrons. Isolated non-prompt photons are generated in hard photon bremsstrahlung, where the photon is radiated at a sufficient angle to the jet. Several photon triggered jet and jet substructure observables show significant contributions from inclusive photons, yielding an improvement in comparison with experimental data. Novel photon triggered jet substructure observables are also expected to show new structures, yet to be detected in experiment. This effort examines the significance of isolated non-prompt photons using parameters tuned for a simultaneous description of the leading hadron and jet spectrum, and thus provides an independent verification of the multistage evolution framework.

Category

Theory

Collaboration

JETSCAPE

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