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Jet quenching studies with new jet substructure and suppression measurements in ATLAS

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Measuring the jet substructure in heavy-ion collisions provides exciting new opportunities to study detailed aspects of the dynamics of jet quenching in the hot and dense QCD medium created in these collisions. In this talk, we present new ATLAS measurements of jet substructure performed using various jet (de)clustering and grooming techniques. Measurements of inclusive jet suppression (R_{AA}) in heavy-ion collisions are presented for the first time as a function of the jet substructure using both nominal ($R = 0.4$) and large-radius ($R = 1.0$) jets in Pb+Pb and pp collisions at $\sqrt{s_{NN}} = 5.02$ TeV. The jet substructure is characterized using the Soft-Drop grooming procedure in order to identify subjets corresponding to the hardest parton splitting in the jet. The dynamics of jet quenching is measured and presented as a function of the transverse momentum scale ($\sqrt{d_{12}}$) and the angle of the hardest splitting in the jet. Novel reconstruction methods are utilized to combine and optimize information from the tracker and calorimeter and build jet constituents for the first time in heavy-ion collisions. These new measurements test the sensitivity of jet suppression in the QCD medium to its substructure and the emergence of a critical angle for the onset of color decoherence.

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