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Gluon Production in Heavy Ion Collisions: Beyond the Leading Order

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We calculate the classical single-gluon production amplitude in nucleus–nucleus collisions including the first saturation correction in one of the nuclei (the projectile) while keeping multiple-rescattering (saturation) corrections to all orders in the other nucleus (the target). In our approximation only two nucleons from the projectile nucleus interact: the single-gluon production amplitude we calculate is order-g^3 and is leading-order in the atomic number of the projectile, while resumming all order-one saturation corrections in the target nucleus. Our result is the first step towards obtaining an analytic expression for the first projectile saturation correction to the gluon production cross section in nucleus–nucleus collisions.

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