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## Two-loop form factors for Dark Matter production from colored Standard Model particles

A UV complete model where the Dark Matter (DM) particle interacts with gluons via a colored scalar mediator provides a viable phenomenological model that can be tested at hadron colliders. We consider two cases. First, a zero-jet process where the complete annihilation of Standard Model (SM) particles to DM particles takes place, which contributes to the relic density of DM. The second is a Mono-jet case where an SM particle is produced along with a DM pair. Mono-jet signatures are relevant for Collider searches due to the missing transverse momentum. The Leading order contributions to these processes are loop-induced, which suffer from large-scale uncertainties. NLO QCD corrections are needed to bring down the scale uncertainties. We compute two-loop amplitudes in QCD which contribute to these processes. By decomposing the amplitude in terms of Form factors and making use of the projector technique, scalar Feynman Integrals are obtained. Further, with the help of the IBP identities, an analytical expression for amplitude is obtained in terms of Master Integrals. The amplitude is made UV finite by Counterterm Renormalization. We will discuss the results of the zero-jet case and ongoing work in the mono-jet case.

## Field of contribution

Theory

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