

# Scalars 2023

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## 2-Loop amplitudes for mono-jet production in GSDM

### Content :

A UV complete model where the Dark Matter particle interacts with gluons via a colored scalar mediator provides a viable phenomenological model that can be explored at Hadron colliders. Leading order contributions to mono-jet production which are loop-induced suffer from large-scale uncertainties. NLO QCD corrections are needed to bring down the scale uncertainties. Keeping this goal in mind, we compute the UV finite two-loop amplitudes which are relevant to monojet production in the Gluonlike Scalar Dark Matter (GSDM) model. 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 preliminary results for the cases of massless and massive mediators.

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