

Dark SUSY 2018 MC Proposal

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Generator Meeting

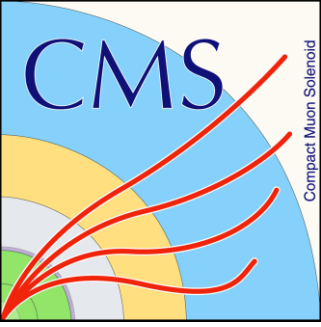
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Proposal

- Go with MadGraph5 (MG5) with privately generated LHE (pLHE)
- Reasons
 - No expertise
 - Little manpower
 - Instead, we propose to keep using MG4 and pLHE

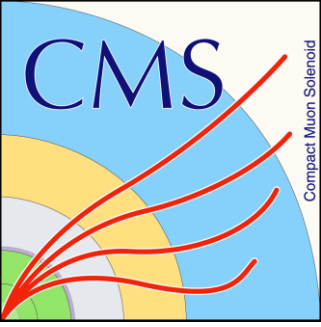
Why keep MG4?

- No experience with MG5 or Universal Feynrules Output (UFO) format
 - Huge changes between MG4 and MG5
 - MG5 needs to take in Dark SUSY model customized in UFO format
 - Ideally need to start from FeynRules and produce a UFO model
 - Even with the UFO manual, we are (I am) struggling with customizing Dark SUSY model
 - Will be error-prone if we go with MG5 immediately this year
 - Can work on moving to MG5 while developing main analysis



Why keep MG4?

- Limited manpower
 - Many major changes in the 2018 analysis, including the extension of search mass, final state, fiducial volume, etc
 - Validation of new procedures and generated samples (if we can generate) in MG5 also take time (unknown)
 - Want to focus on major changes with limited manpower



Why keep MG4?

- MG4 recipe just finalized
 - All the recipes are available for MG4, just finalized in 2017
 - Will have a huge impact on our man power if need to start from scratch for MG5 in 2018

Why pLHE?

- Need to run separate script^[1] to modify lifetimes to dark photons in pLHE files produced from MG4
 - Reached out to Kenneth Long, doing this in gridpack seems possible, but not easy
- Little change between LHE format from MG4 to MG5
- We went with pLHE in 2017 central MC production

[1]https://github.com/cms-tamu/MuJetAnalysis_DarkSusySamples_LHE_Generation/blob/master/replace_lifetime_in_LHE.py

Alternative

- We'd appreciate and be very happy to move to MG5 if...
 - Some real help is provided from UFO (especially) and MG5 experts
 - I tried to modify UFO python files^[2] as in MG4, not one-to-one correspondence between two Madgraph versions (huge changes)
 - Efe once suggested I contact UFO expert Benjamin Fuks, he suggested I refer to the UFO manual^[3] and better start from building models in UFO format
 - Currently struggling on the first step...
 - Can you put us in contact with someone to help us side-by-side?
 - Know any other group that implemented the model using UFO?
 - Or better, some experts could help us customize the Dark SUSY model in MG5
- If not, that means I need to learn to use MG5 and UFO alone... ☹️☹️☹️

[2] https://github.com/weishi10141993/DarkSUSY_MC_MadGraph5_aMC-NLO

[3] <https://arxiv.org/abs/1108.2040>