

# DarkLight MC Samples

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May 28th 2024

# Intro

- Have been chipping away at creating some centralized samples
- What I would consider the “beta” version of these (i.e. I’m pretty sure they are fine, but use with caution and know that there are some tweaks and possibly some debugging incoming) is now in this folder on Cedar:  
~/projects/def-kpachal/shared-data/darklight\_mc
- Designed to include everything in the cross section scaling except for parameters that will be changed frequently (e.g. lumi,  $\epsilon^2$ )

# Signal samples

- Currently named with `_SIG_` in the file name for various DP masses
- Weights stored in microbarns
- Everything is folded into the event weights except for  $\epsilon^2$

$$\sigma_{\text{sig}} = \frac{\left( \sum_{i=0}^{N_{\text{evts}}} w_i \times 10^{-30} \right) \times \epsilon^2}{\mathcal{L}}$$

# How to use QED background samples

- File with \_INT\_ in the file name
- Cross section weights stored in microbarns
- Out of the box!

$$\sigma_{\text{QED}} = \frac{\left( \sum_{i=0}^{N_{\text{evts}}} w_i \times 10^{-30} \right)}{\mathcal{L}}$$

# How to use the coincidence background samples

- Current weights are in **microbarns squared**
- Not strictly a cross section as the cross section for this process depends on the cross section of the contributing processes, as well the instantaneous luminosity and bunch frequency
- The dependency on the cross section to the individual e+ and e- cross sections has been folded in, but L and f\_bunch are changeable so they are left out

$$\sigma_{\text{CB}} = \frac{\left( \sum_{i=0}^{N_{\text{evts}}} w_i \times 10^{-60} \right) \times \frac{L}{f_{\text{bunch}}}}{\mathcal{L}}$$

# Things that will be updated

- Code with submission scripts to run the jobs on the Cedar batch needs to be pushed
  - Just need to iron out some streamlining between the main code and scaling script
- The file names to be more descriptive and not as long
- Some setup files need to be revisited post acceptance angle update, so there may be some changes to the composition of the final files
- Radgen nan bug still outstanding
- Having some problems with root keeping an interim ntuple in the final file which I need to get the bottom of (gives the wrong sum of weights if it gets grabbed instead of the full ntuple)