Semi-visible jets: Current status of sample production and analysis

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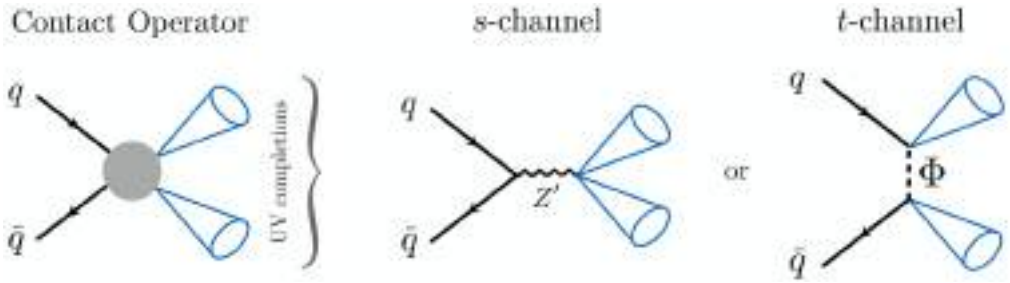
The model

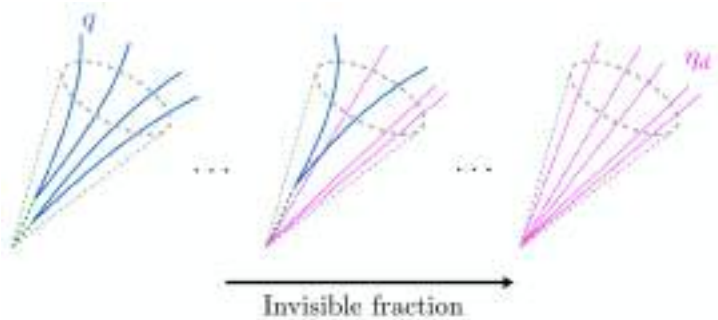
◎ Motivation from complex dark sector coupled to visible via Z'

◎ Free parameters are α_d, $m_{Z'}$, m_d, r_{inv}

◎ Two production channels considered



◎ Dark hadrons decay into stable dark matter and quarks



Workflow

1. Generated gridpack with MadGraph5_aMCatNLO as generator (v2.6.0, NNPDF3.0, LO)

- Tar ball created which includes MadGraph release, model files, input cards, scripts to run

2. Ran gridpack through FullSim CMSSW chain to nanoAOD format

- Pythia 8.226 (with Hidden Valley module) as hadroniser, GEANT4 det. sim.
- Used various versions of CMSSW as backward compatibility is an issue
- Used cmsDriver commands that emulate 2016 MC with 2017 re-processing

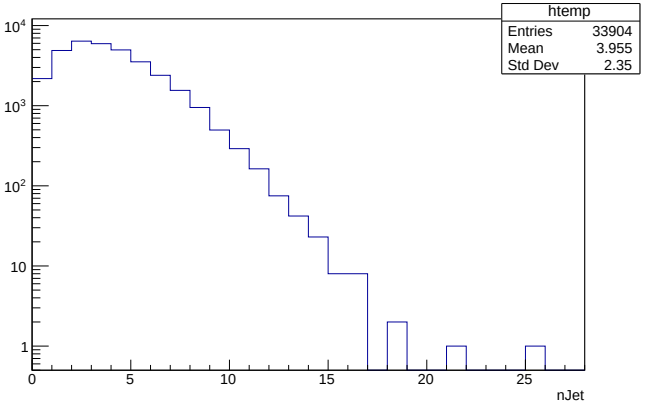
◎ Able to run entire workflow locally and via Condor (full chain takes a few hours on batch)

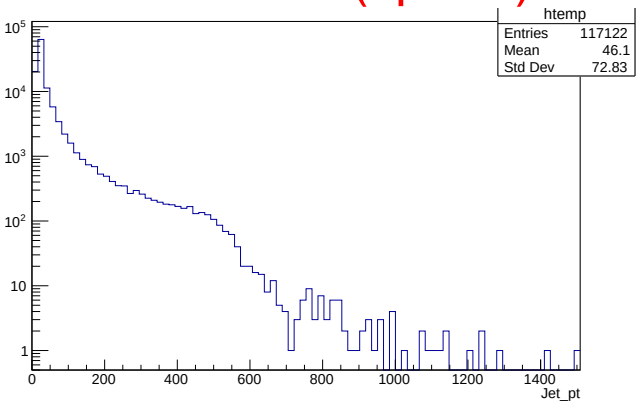
◎ Have been developing a CRAB version, but Bristol is often blacklisted which halts progress

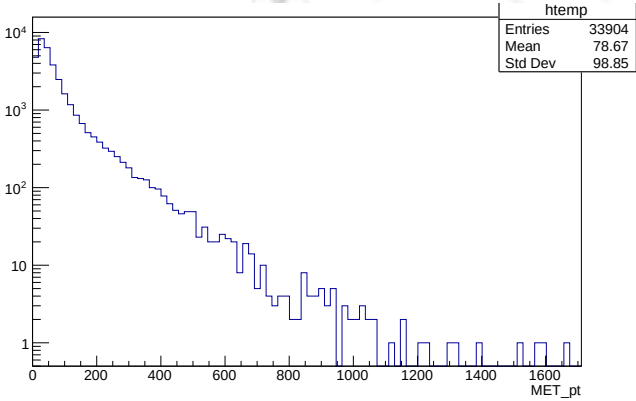
Preliminary plots

*produced with incorrect values of α_d, r_{inv}

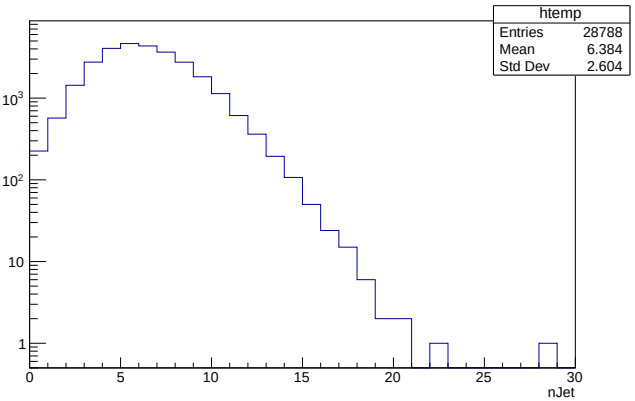
s-channel (spin-1)

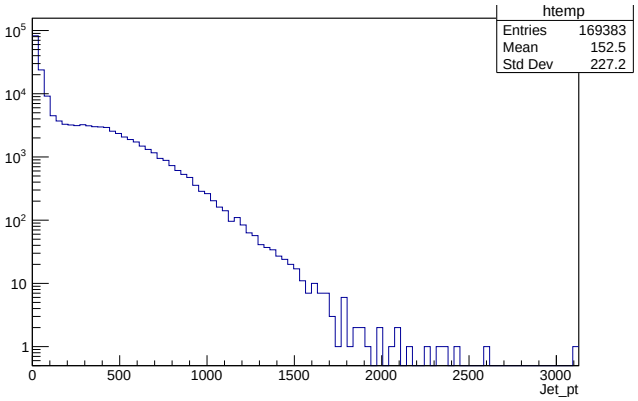


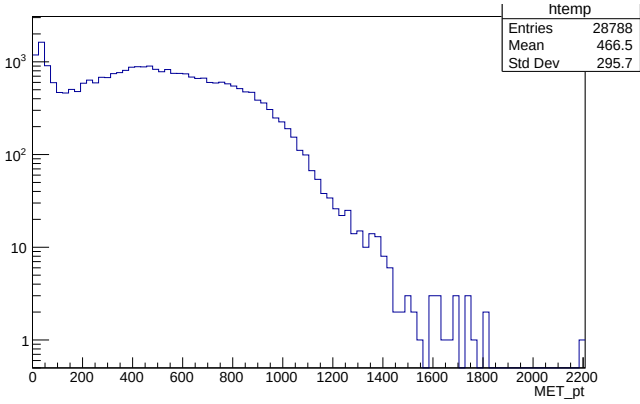




t-channel







Current status

◎ Able to produce signal MC on batch and vary model parameters for a scan of parameter space

◎ Been collaborating with UZH and, since recently, with Fermilab and Rochester

◎ Americans have samples for s-channel. I will work on t-channel

◎ Discriminating variables (E_T^{miss} , $\Delta\phi$ – related to cut QCD) and backgrounds have been looked at

◎ Analysis slowly being developed but don't have much of an idea on systematics, *powerful* discriminators, triggers

◎ Planned to show first look at model and analysis at CMS Week, but need to present in MET+X subgroup first

Backup