

MC11/12 Validation and Production: Higgs to Displaced, Heavy Fermions

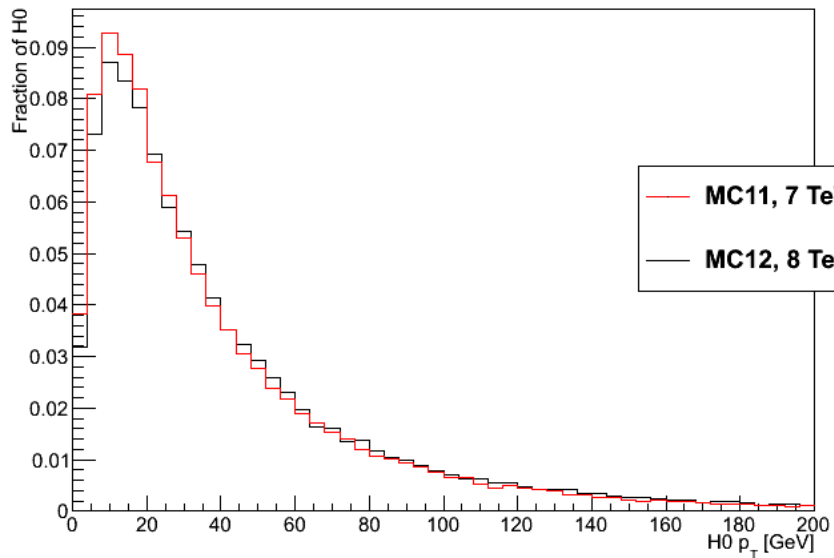
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Validation Plots

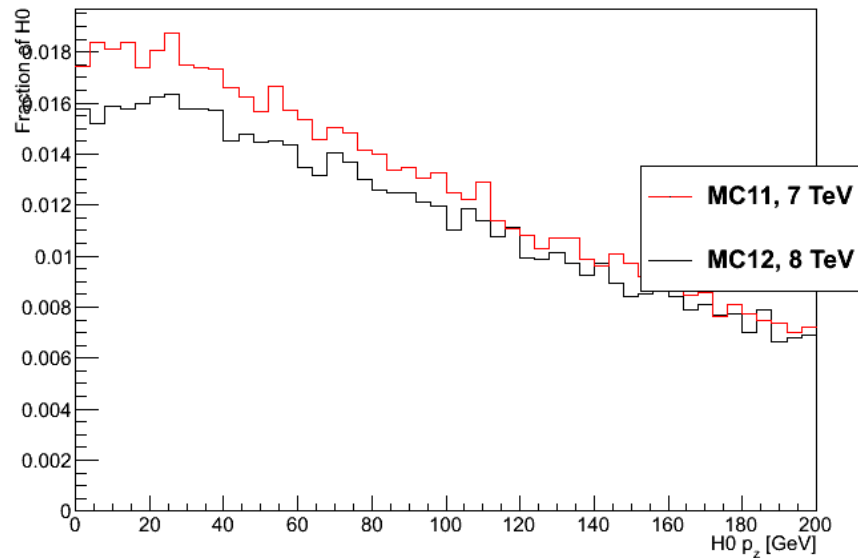
- Validation plots on our twiki:
<https://twiki.cern.ch/twiki/bin/viewauth/AtlasProtected/HiddenValleyDisplacedDecaysPythia8>
- In the following slides, I show a sample of the validation plots with mass points
 $m(H) = 120 \text{ GeV}$, $m(\pi_\nu) = 20 \text{ GeV}$.
- MC11 Production uses PDF CTEQ6L1
MC12 Production uses PDF MSTW2008

Higgs Momentum

H0 p_T

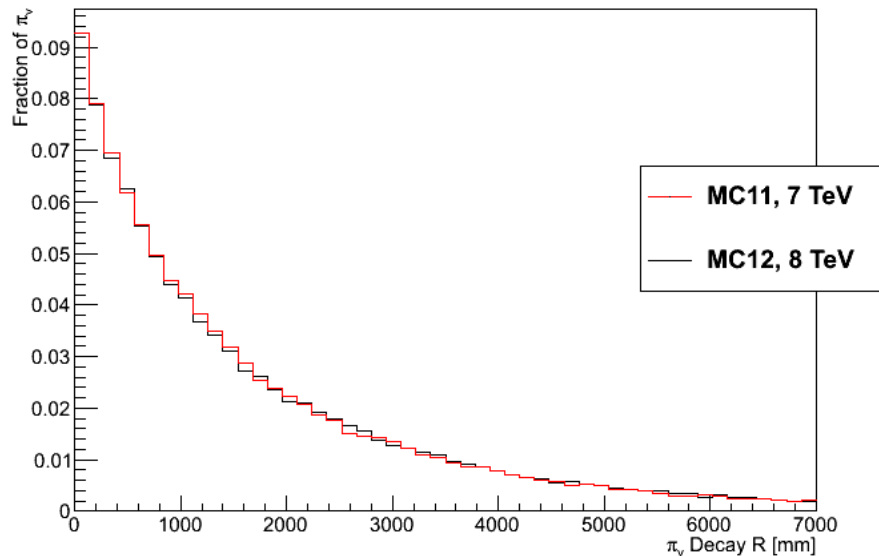


H0 p_z

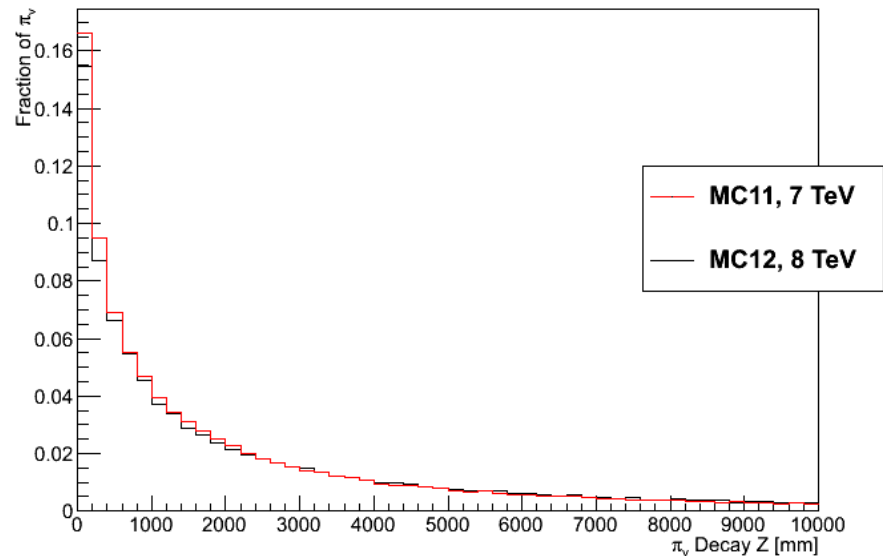


π_ν Decay Position

π_ν Decay R

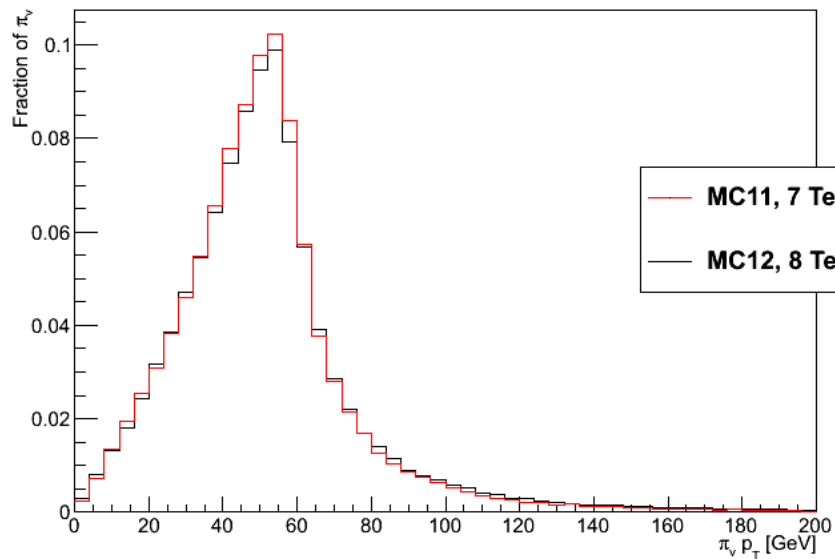


π_ν Decay Z

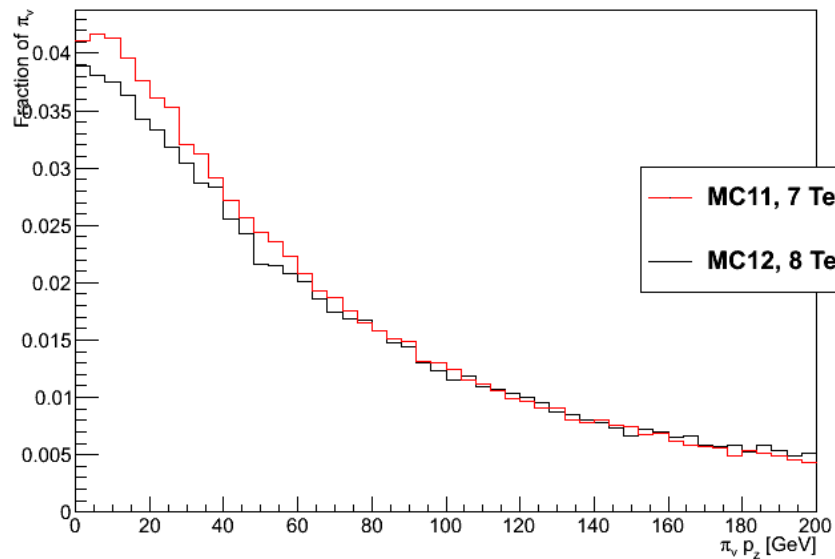


π_ν Momentum

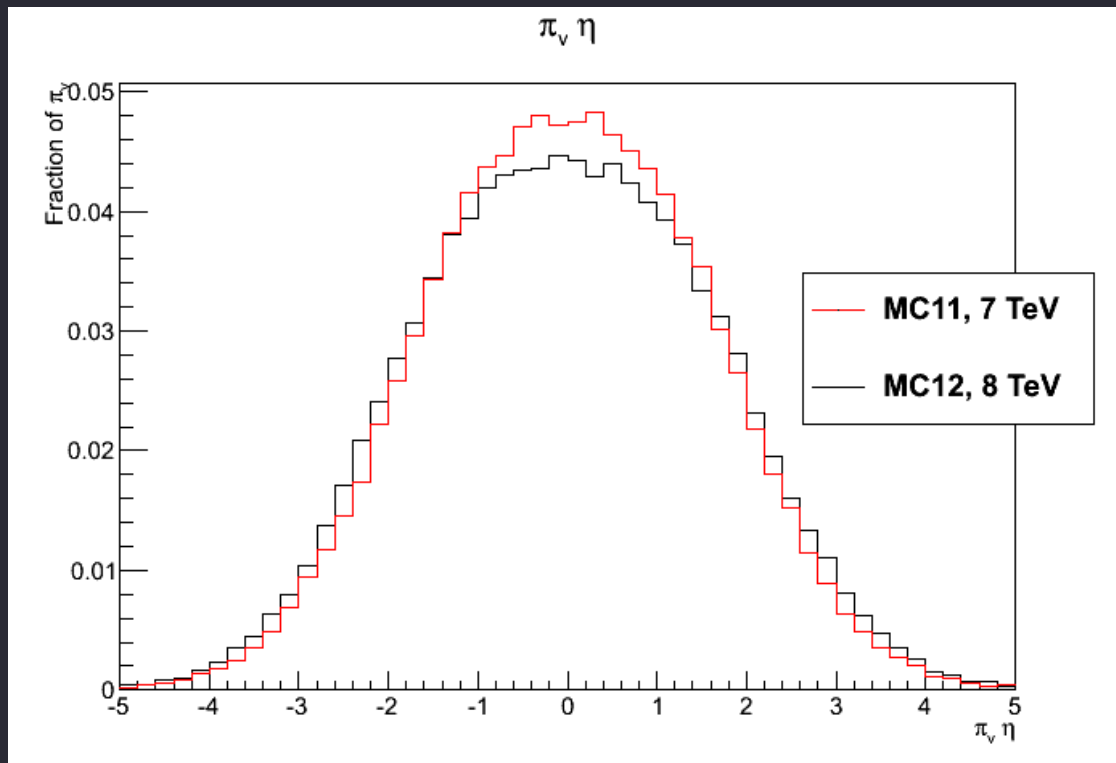
$\pi_\nu p_T$



$\pi_\nu p_z$

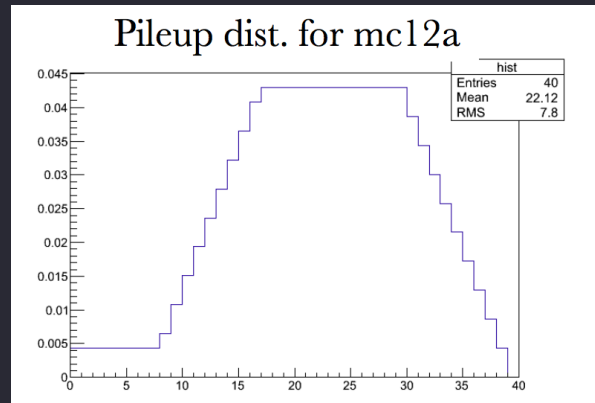
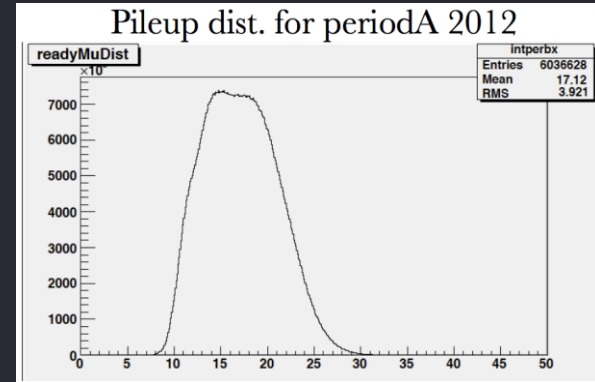


$\pi_\nu \text{ Eta}$



Plans

- Request $\sim 250,000$ events for MC12.
- We would like enough MC signal events that our results are limited by systematic errors.
- We also note that pileup reweighting reduces the statistical significance of signal events.



MSVx Analysis Package

- A SVN package with our analysis code has been created:

`svn+ssh://svn.cern.ch/repos/atlasgrp/Physics/Exotic/Analysis/LongLived/HVHeavyFermionPairs/MSVxAnalysis/`

- If there is analysis code which could be used by multiple analyses, we should try to identify it and make a shared package.

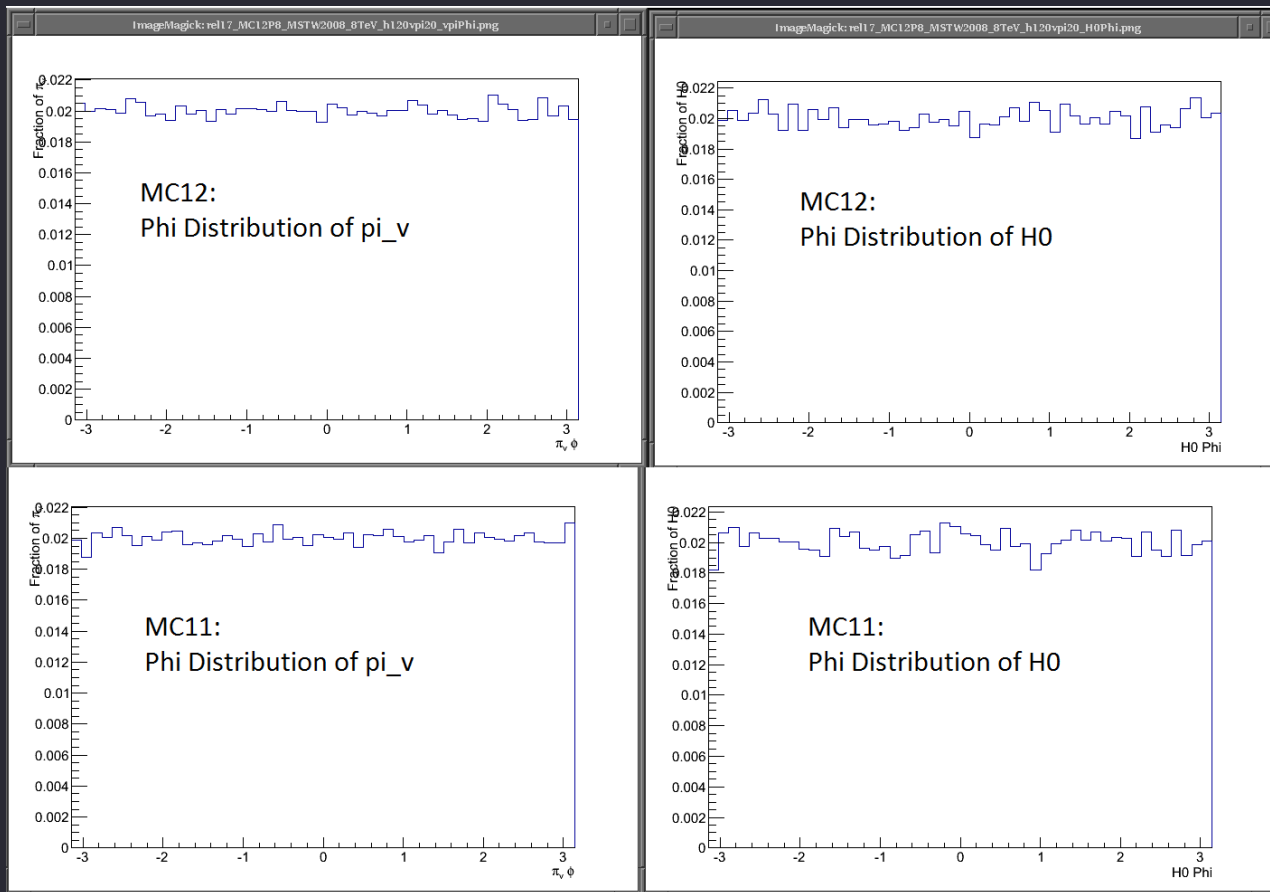
Current MSVx Package Contents (1)

- TruthAnalysis – Runs over fully reconstructed MC signal events. Determines trigger and vertex reconstruction efficiencies for analysis.
- EvgenSample, EvgenSkimmer – Generates large samples of events at the MC level and skims the file to a more manageable size.

Current MSVx Package Contents (2)

- LifetimeLimits – From EvgenSkimmer output, calculates the expected number of events to pass analysis cuts as a function of π_ν lifetime.
- LifetimeLimitsII – Transforms the expected number of events to an exclusion limit.

Phi distribution of MC Signal generated in Pythia 8



Conclusions

- Event generation appears to behave correctly.
- Once approval has been granted, MC11/12 official production will begin.

Backup Slides

