

# VBF Higgs to Invisible

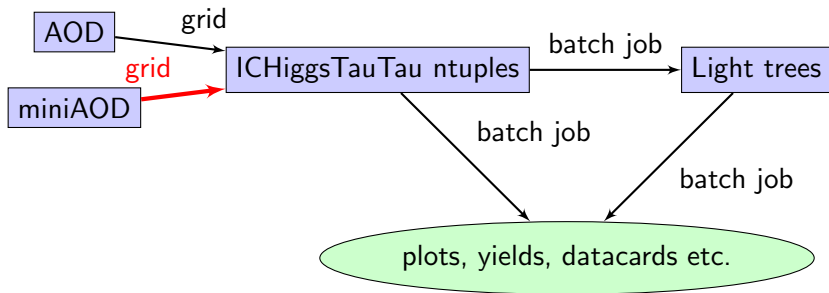
HIG-14-038, AN-14-243

## Overview

- ▶ We plan to make ntuples from miniAOD
- ▶ Working with other ICHiggsTauTau users to update ntuple maker to new recipes
  - Adinda de Wit, Andrew Gilbert, Rebecca Lane
- ▶ Will go through progress on objects that have been looked at so far

## Reminder of framework structure

- Focus today on miniAOD to ntuples



## Electrons

- ▶ In run 1 we used cut based identification at veto and tight working points
- ▶ Updated for run 2
  - Ntuples already contain all required variables
  - `istight()` etc. functions will be updated to new cut values
  - Details [here](#)

## Muons

- ▶ In run 1 we used cut based identification at loose and tight working points
  - These are currently unchanged for run 2
- ▶ In run 2 there is also a medium working point with better fake rejection than loose but still high efficiency
  - Ntuples have been updated to contain variables required
- ▶ Updated for run 2, code has been updated to store all needed variables in ntuples
  - Details [here](#)

## Taus

- ▶ In run 1 we used same ID as  $H \rightarrow \tau\tau$  group
- ▶ Baseline ID to be used by  $H \rightarrow \tau\tau$  in run 2 currently being implemented
  - Details [here](#)

## Jets

- ▶ In run 1 we used ak5 non-CHS jets
- ▶ Switching to ak4 for run 2
- ▶ Only CHS jets are stored in miniAOD
  - We can remake non-CHS jets from packed candidates but no pu jet ID available until CMSSW\_7\_4\_X
- ▶ ak4PFCHS jets reclustered from packedCandidates now verified same as those in miniAOD
  - Gives confidence for remaking ak4PF jets without CHS
- ▶ B tag information is stored

## MET

- ▶ In run 1 we used type0PC+type1 corrected MET
- ▶ type 1 corrected MET is stored in miniAOD
- ▶ Can remake raw PF met from packed candidates
  - No recipe to go from this to type0+1, Chayanit investigating
- ▶ JetMET may recommend use of MVA met
  - TauTau group use this already so we should be able to implement it as well



## Photons

- ▶ Not used in run 1
- ▶ For run 2 we aim to use a  $\gamma$ +jets region
- ▶ Variables needed for POG cut based photon ID are now stored
  - Details [here](#)

## Generator information

- ▶ MiniAOD has two gen information collections:
- ▶ prunedGenCandidates: full info on a limited set of gen particles
  - Currently contains all leptons and b quarks
  - Evolving rapidly
- ▶ packedGenCandidates: packed info on all status 1
  - Mainly for clustering gen jets
- ▶ Currently working on storing the information we need

## Trigger and other information

- ▶ We have the updated recipes for saving vertex information
- ▶ We store the new fixedGridRho energy density variable
- ▶ We store trigger paths and HLT objects
- ▶ Need to implement L1 extra storage

## Summary

- ▶ Leptons and photons are in a good state
- ▶ Jets are in progress
  - ak4PFCHS jets are in and checked
  - ak4PF will need to wait until 74X
- ▶ type1 MET is in
  - Needs verification and we are waiting for type 0 corrections
- ▶ Progress is being made on generator level information
- ▶ Recipes are evolving so updates will be necessary
- ▶ Still need to look at tracks and L1 information

## Backup