UNIVERSITY
of
GLASGOW

WH, H->bb

UPDATE 25 / 04 / 2011

UPDATE ON SYSTEMATICS

- JES
- Using the JES Uncertainty Tool
- JES is nominal, +ve and –ve shift applied using Uncertainty Tool
- JER.
- Nominal is Jet without smearing. Appiy smearing and get abs uncertainty
- Jet Reco Efficiency
- (https://twiki.cern.ch/twiki/bin/view/AtlasProtected/TopSystematicUncertainties#Jets)
- Randomly drop jets from the event? Top Group have done a study…Will need to do own
- Muon Trigger Efficiency
- Top Group have a Tool. Is it applicable to my study?
- Muon Efficiency SF
- Apply SF (nominal) and Apply upward/downward shifts using uncertainties
- Muon Momentum scale
- Apply smearing (nominal) and upward/downward shifts to see change in smearing

CONTINUED

- **Muon Momentum Resolution**
- Method explained here:
  https://twiki.cern.ch/twiki/bin/view/AtlasProtected/TopCommonScales
- four smearing runs (UPID,DOWNID,UPMS,DOWNMS)
- syst on final observables W and H will be (diff_max-diff_min)/2
- **Electron Trigger Efficiency**
- Same story as muons…Will I use this tool
- **Electron Reco Efficiency**
- Apply SF (nominal) and shift up/down to get difference
- **Electron Energy Scale (Data)**
- Apply Scale (nominal) and shift up/down to get difference
- **Electron Energy Resolution**
- Apply smearing (nominal) and shift up/down to get difference
- **Electron ID Efficiency**
- Apply an additional 1.5% uncertainty to Reco Eff (haven't applied). Apply at the end?
- **Pile - Up**
- Apply Scale (nominal) and shift up/down to get difference

CONTINUED - MET

- Apply JES, Electron Energy Scale/Smearing, Muon Momentum Scale/Smearing , JER and CellOut contributions to MET individually to see difference.
- Will need to include all Electrons, Jets and Muons not just ones that pass Analysis cuts.
- when adding the contributions from JES, Electrons and Muons I need to take into account the weighted contribution.
- Example

```
met_etx += Jet_Ex*Jet_weightx;
met_ety += Jet_Ey*Jet_weighty;
met_et = sqrt(met_etx**2 + met_ety**2);
```

- Get difference between new and old MET
- Detailed info can be found here:

https://twiki.cern.ch/twiki/bin/view/AtlasProtected/TopETmissLiaison16-0-3-8-2

I HAVE ONLY CODED FOR CELLOUT CONTRIBUTIONS WILL INCLUDE OTHER CONTRIBUTIONS SOON.

OTHER SYSTEMATICS

- Luminosity 3.2%
- b – Jet Energy Scale
- b - Tag Calibration
- PDF
- Background Specific Systematics
  1. ISR/FSR
  2. MC Generator (Comparisons)
  3. Parton Show (Comparisons)
  4. Mass uncertainty W mass
  5. Background Shapes
  6. Lots more.....

HISTOGRAMS

- Each cut is Plotted. Shows flow of cuts on objects. Plots are normalized to their Lumi by default
- All Jet, Muon and Electron Pt, Eta,Phi and Number plotted
- Lead Muon and Electron Pt, Eta and Phi plotted
- dPhi between lepton and EtMiss plotted
- Muon Isolation plotted
- muon z0 and d0 plotted TH2f (2D Plot)
- lepton Etmiss invariant mass
- Dijet invariant mass
- MET
- b – weighted Jets Pt,Eta,Phi and b - weight (TH1f and TH2f)
- Anymore ????