$H \rightarrow \tau\,\tau \rightarrow e/\mu\,\tau$

22 April 2018

Andrea Cardini

Today's topics:

First look at 2017 DATA

DATA/MC comparison in Control Region

Normalization problem

DATA/MC comparison for different RUNs

2017 DATA

- Triggers:
  - μ τ channel:
    - Single Muon: IsoMu27
    - Cross trigger: Mu20 Tau24
  - e τ channel:
    - Single Electron: IsoEle35
    - Cross trigger: Mu24 Tau30
- Json file: DesyTauAnalyses/NtupleMaker/test/json/Cert_294927-306462_13TeV_PromptReco_Collisions17_JSON.txt
- Pileup file: DesyTauAnalyses/NtupleMaker/data/PileUpDistrib/pileup_data_2017Rereco.root

2017 DATA

- Trigger efficiencies:
  - μ τ channel:
    - Single Muon: HTT-utilities/LepEffInterface/data/Muon/Run2017/Muon_IsoMu27.root
    - Cross trigger: HTT-utilities/LepEffInterface/data/Muon/Run2017/Muon_MuTau_IsoMu20.root
  - e τ channel:
    - Single Electron: HTT-utilities/LepEffInterface/data/Electron/Run2017/Electron_Ele35.root
    - Cross trigger: HTT-utilities/LepEffInterface/data/Electron/Run2017/Electron_EleTau_Ele24.root

2017 DATA

- Isolation efficiencies:
  - μ τ channel:
    - DesyTauAnalyses/NTupleMaker/data/Rereco2017BCDEF_leptonSF/Muon_IdIso_IsoLt0.15_eff_RerecoFall17.root
  - e τ channel:
    - DesyTauAnalyses/NtupleMaker/data/Rereco2017BCDEF_leptonSF/Electron_IdIso_IsoLt0.10_eff_RerecoFall17.root

- To do:
  - Anti-isolation efficiencies

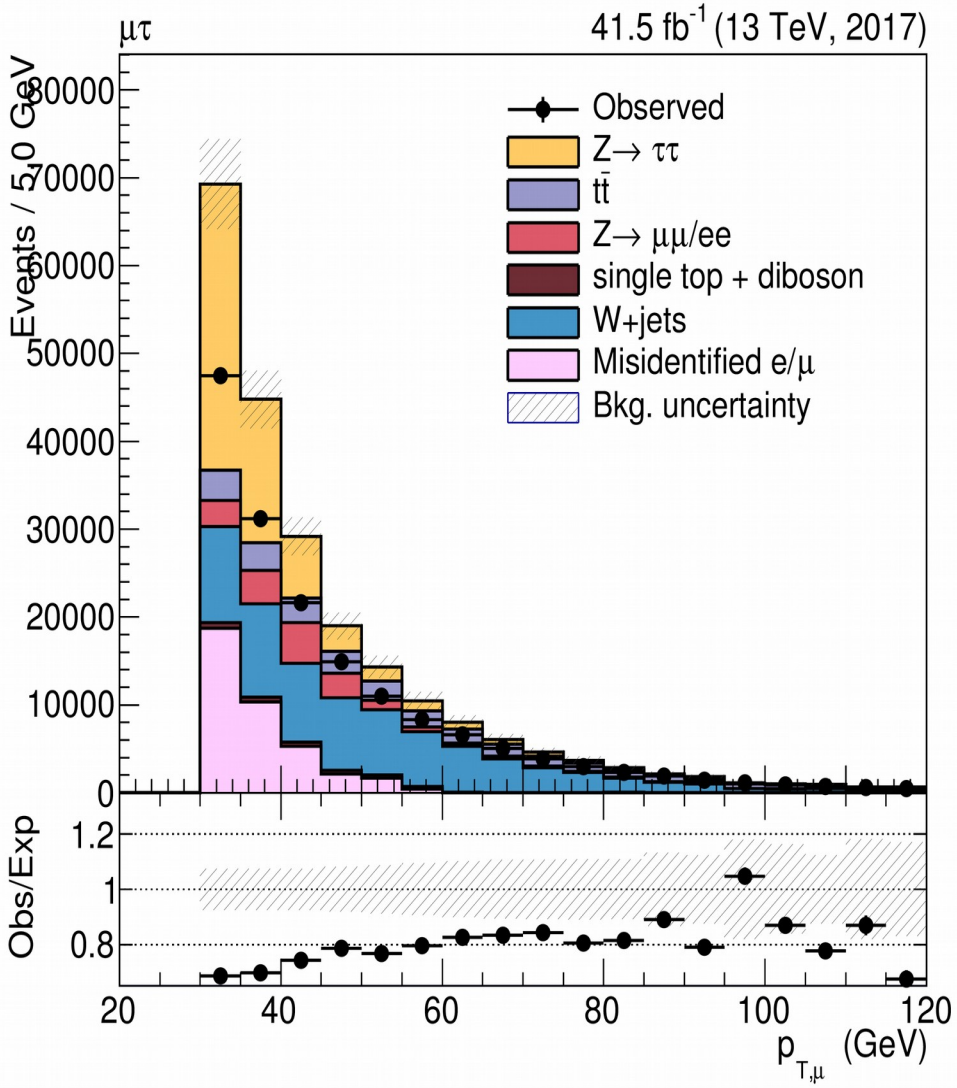
MC samples

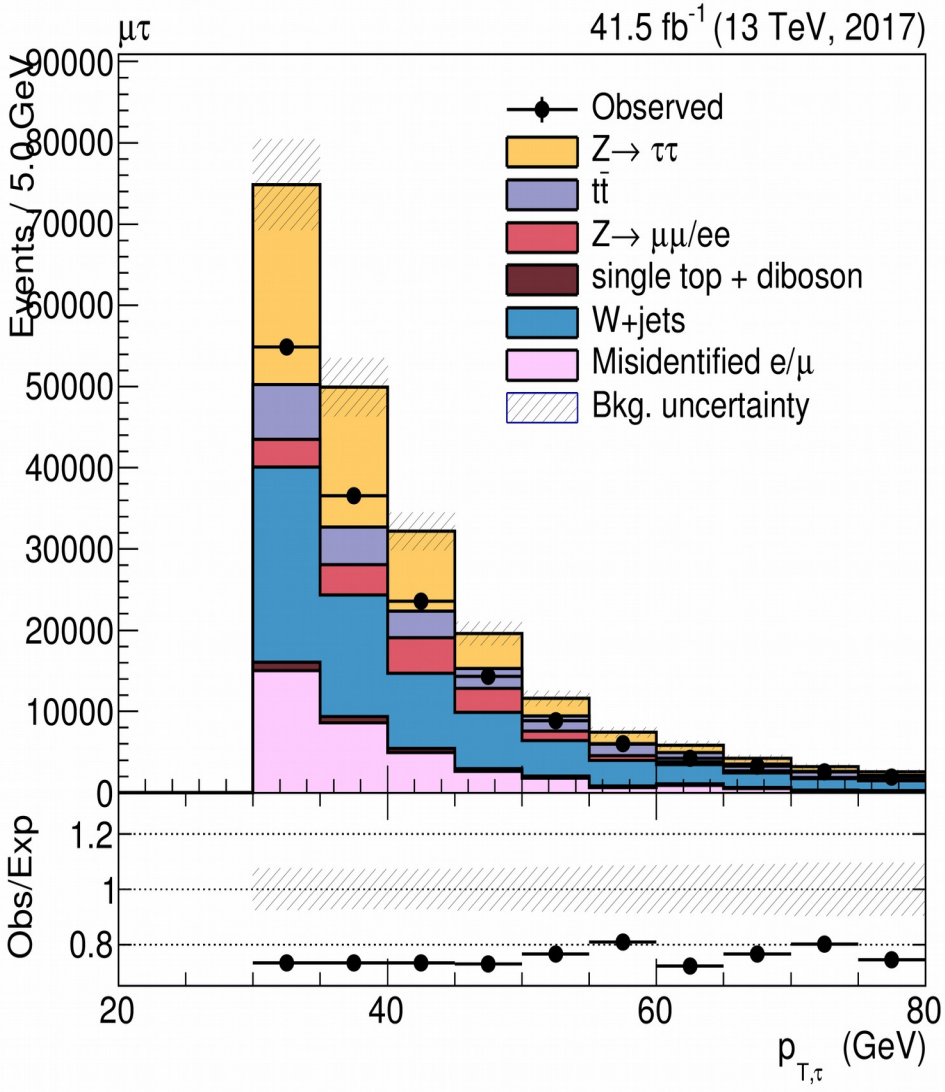
Process	Samples	
DY	• DYJetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8 • DYJetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8_ext1 • DY1JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8 • DY1JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8_ext1/	• DY2JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8 • DY2JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8_ext1 • DY3JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8 • DY4JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8
tt **t W**	• TTToSemiLeptonic_TuneCP5_Psweights_13TeV-powheg-pythia8 • TTTo2L2Nu_TuneCP5_Psweights_13TeV-powheg-pythia8 • TTToHadronic_TuneCP5_PSweights_13TeV-powheg-pythia8	• ST_tW_top_5f_inclusiveDecays_TuneCP5_13TeV-powheg-pythia8 • ST_tW_antitop_5f_inclusiveDecays_TuneCP5_13TeV-powheg-pythia8 • ST_t-channel_top_4f_inclusiveDecays_TuneCP5_13TeV-powhegV2-madspin-pythia8 • ST_t-channel_antitop_4f_inclusiveDecays_TuneCP5_13TeV-powhegV2-madspin-pythia8
W+Jets	• WjetsToLNu_TuneCP5_13TeV-madgraphMLM-pythia8 • W1JetsToLNu_TuneCP5_13TeV-madgraphMLM-pythia8 • W2JetsToLNu_TuneCP5_13TeV-madgraphMLM-pythia8	• W3JetsToLNu_TuneCP5_13TeV-madgraphMLM-pythia8 • W4JetsToLNu_TuneCP5_13TeV-madgraphMLM-pythia8
VV	• WW_TuneCP5_13TeV-pythia8 • WZ_TuneCP5_13TeV-pythia8	• ZZ_TuneCP5_13TeV-pythia8

Event selection (μ τ)

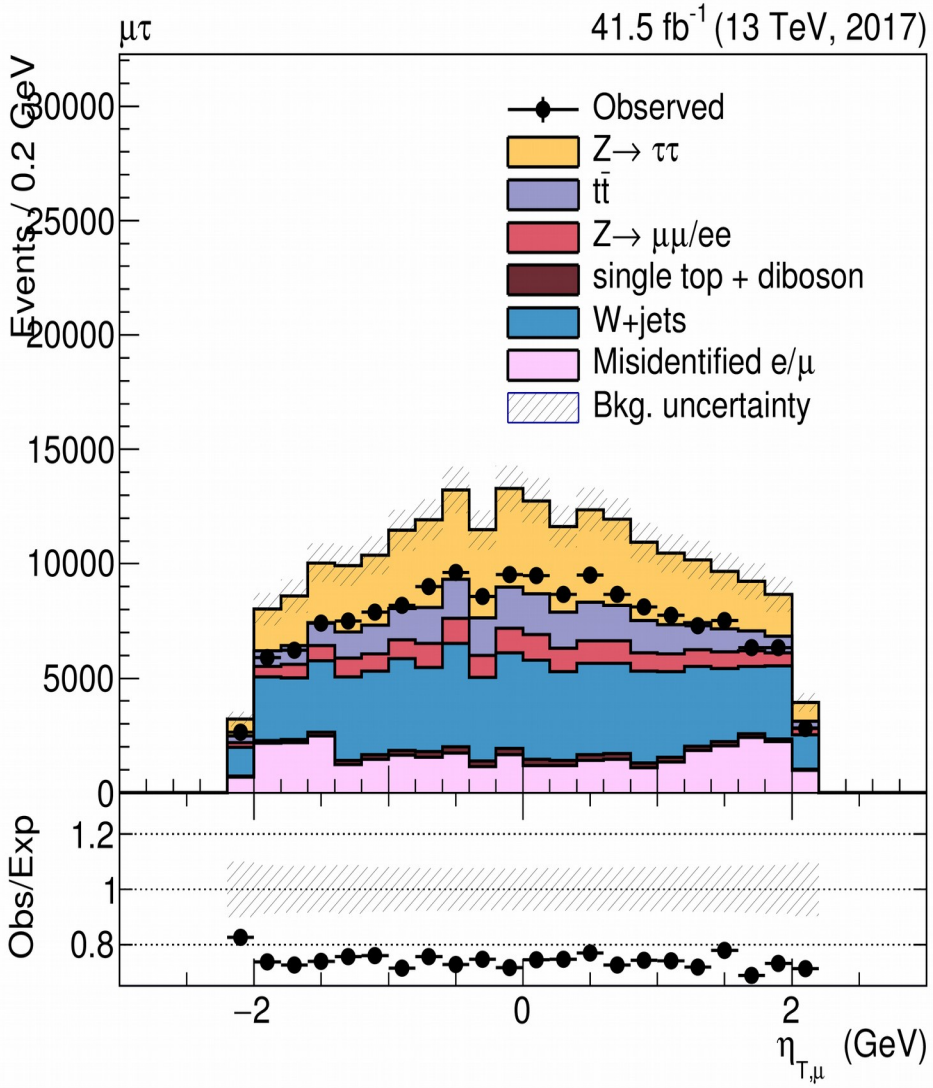
- Muon
  - Pt > 30 GeV
  - Eta < 2.1
  - Iso < 0.15
- Tau
  - Pt >30 GeV
  - Eta < 2.3
- mt1 < 50 GeV
- Extra lepton veto (pt < 10 GeV)
- Delta R < 0.5

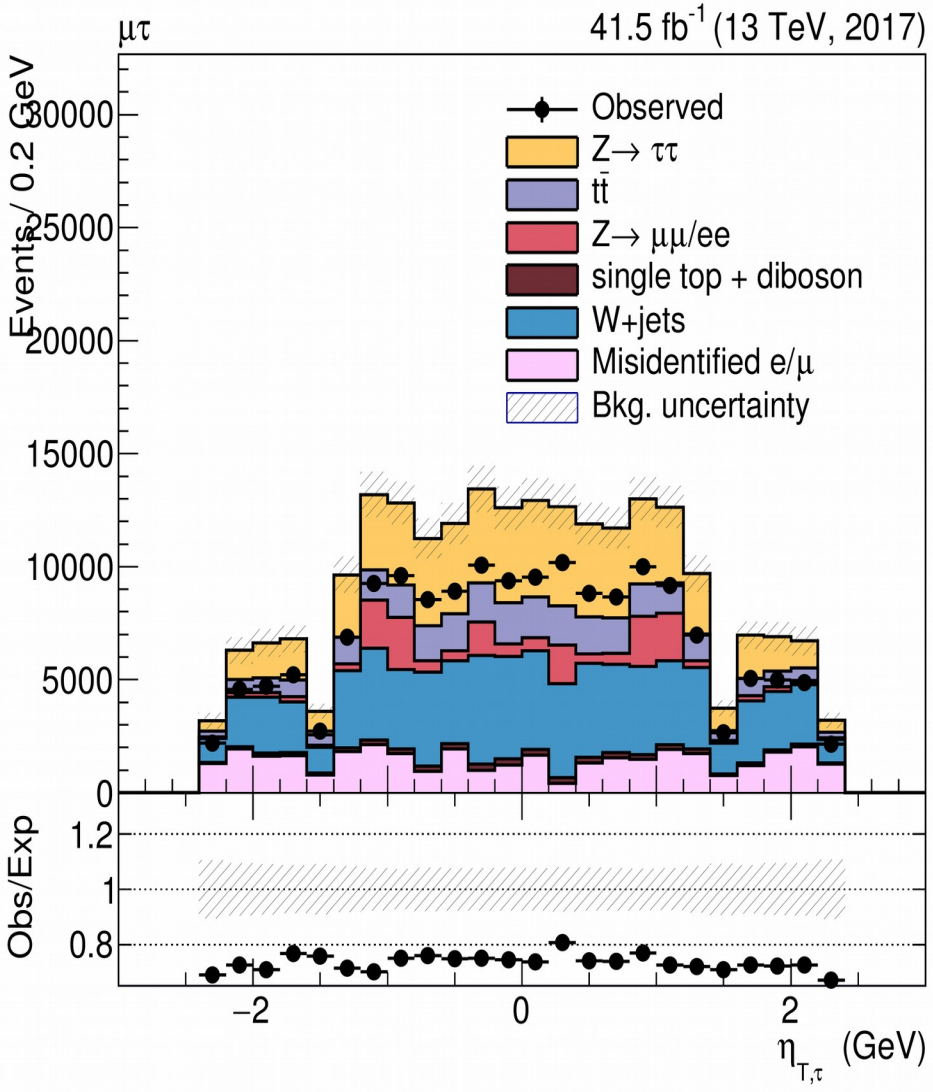
Control plots



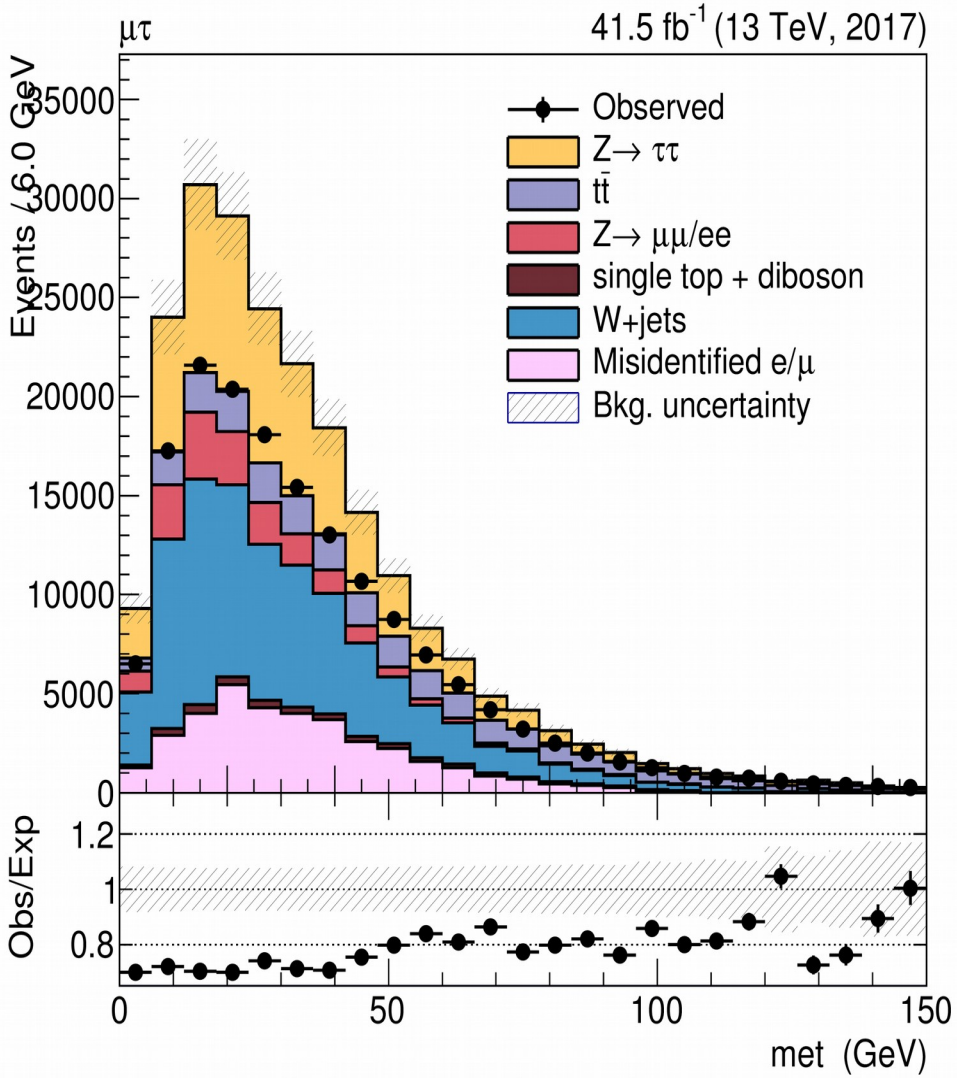


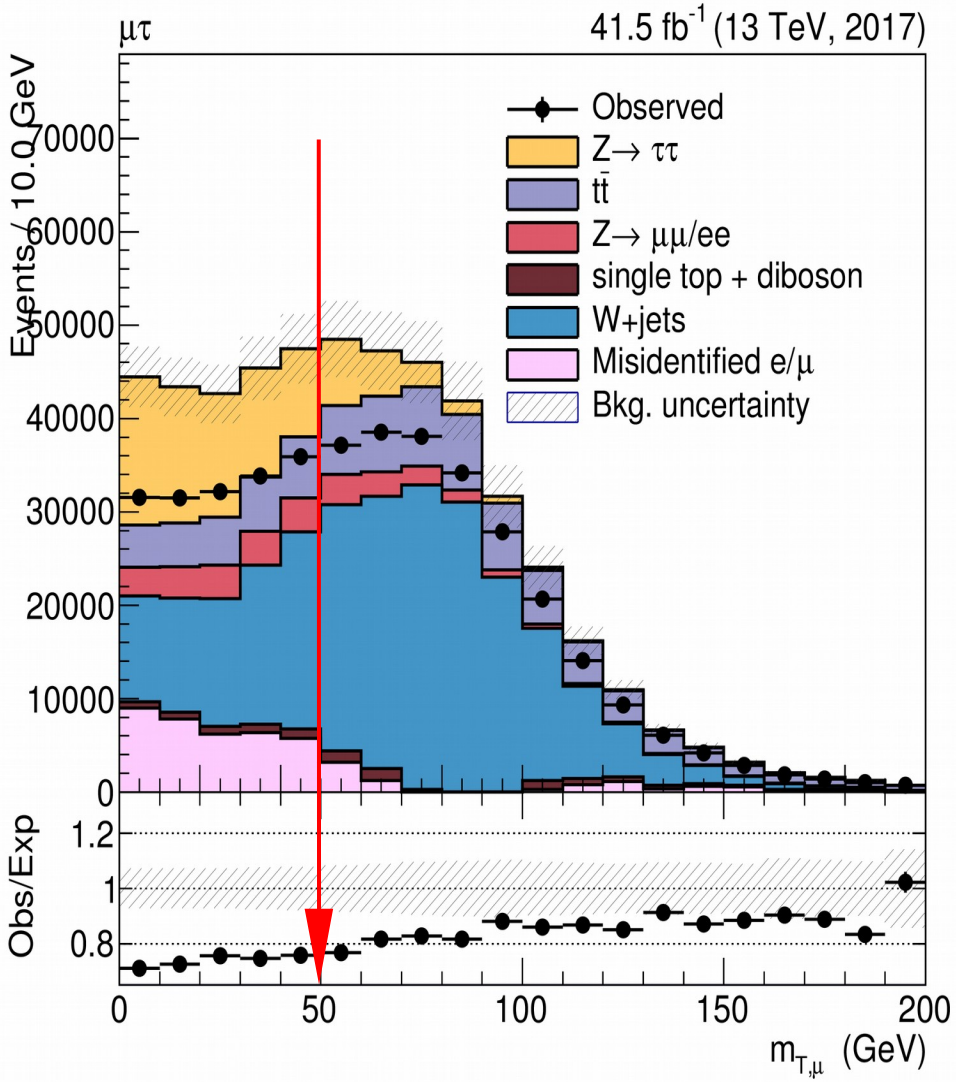
Control plots



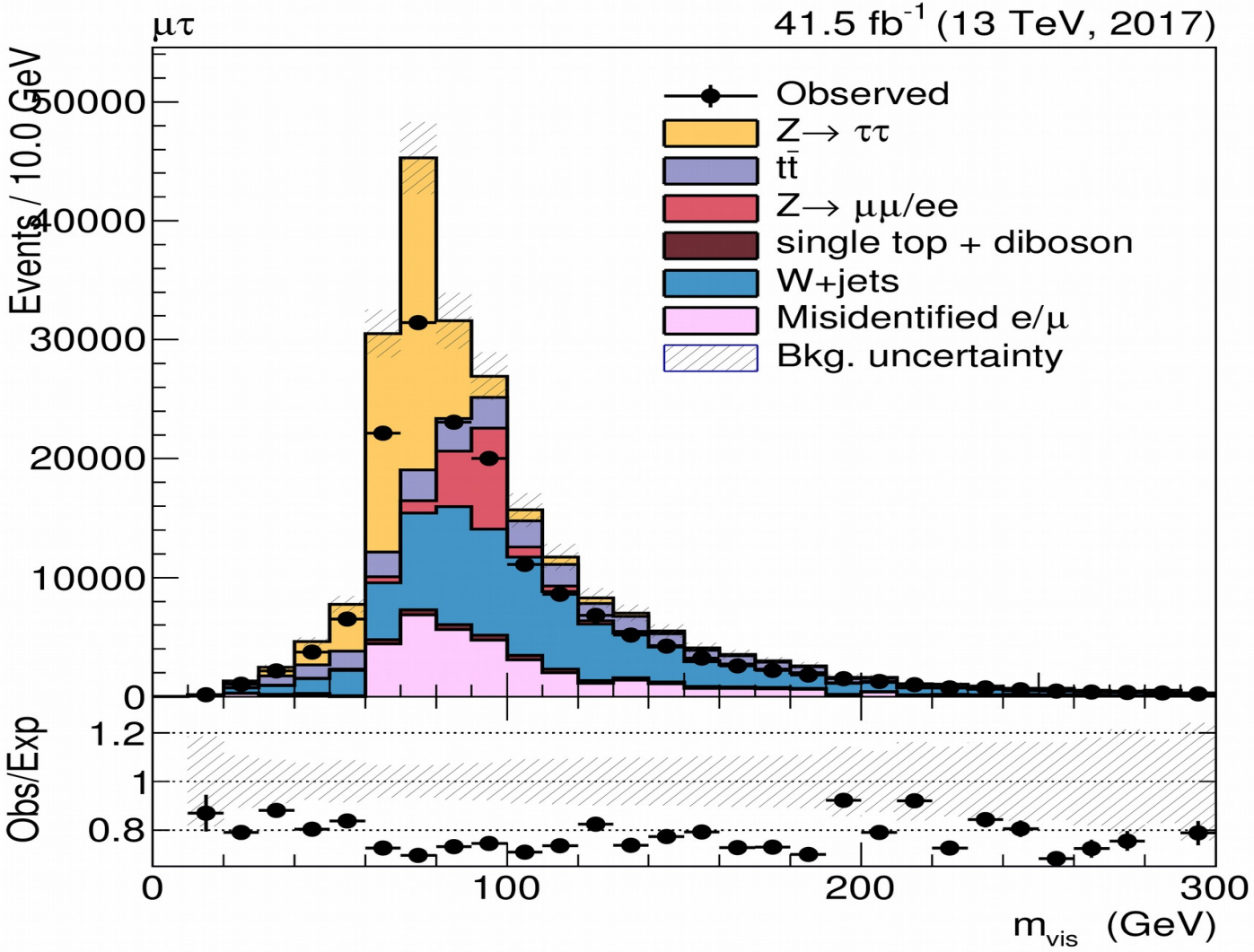


Control plots





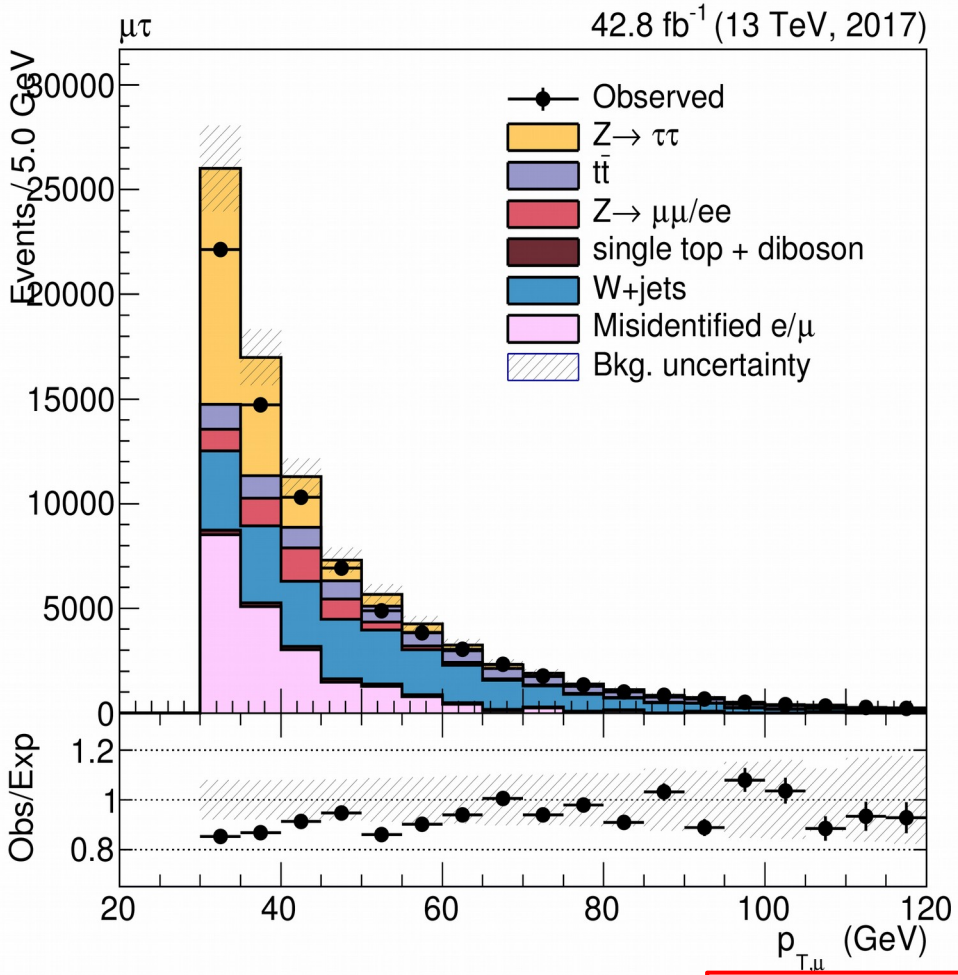
Control plots



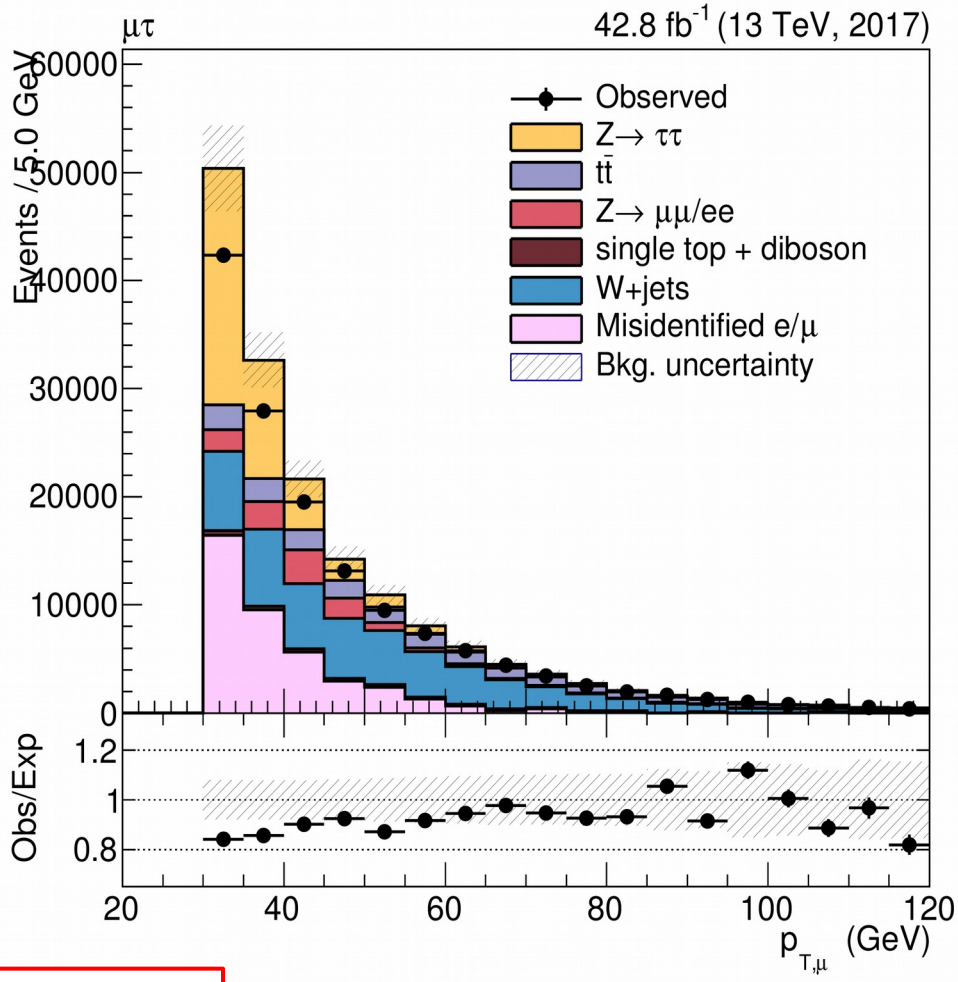
All distributions show similar discrepancy between DATA and MC

DATA/MC comparison in different Runs

Run B+C



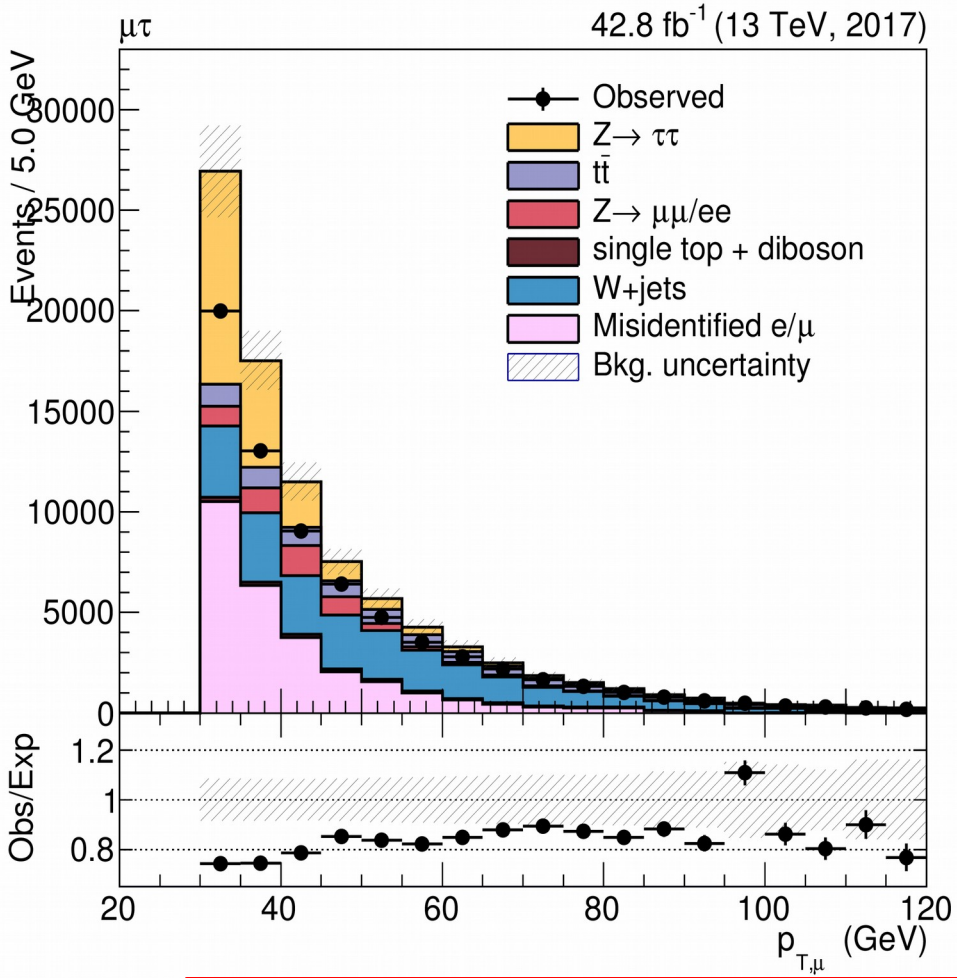
Run B+C+D+E



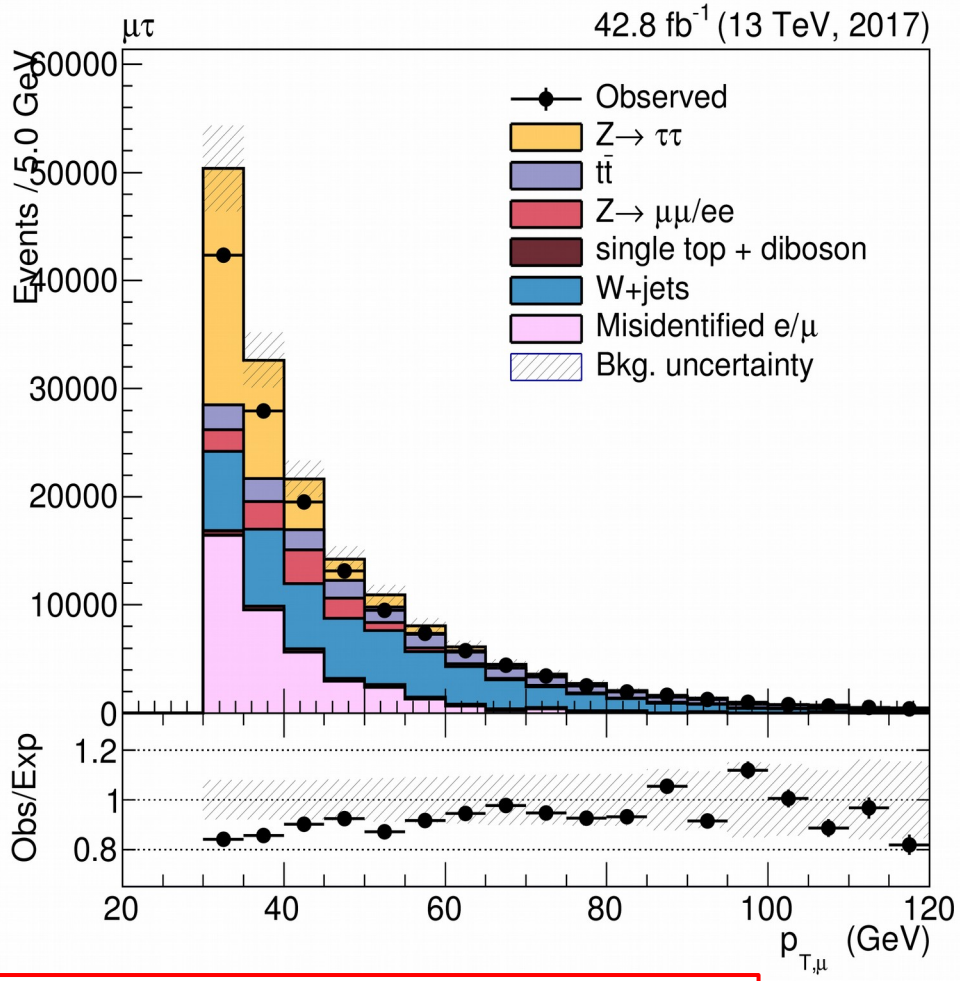
Very little changes

DATA/MC comparison in different Runs

Run F



Run B+C+D+E



Run F seems to have the biggest MC/DATA discrepancies

Possible solutions?

- Cross sections for MC samples were compared to the ones computed by Yi-wen
- Luminosity for DATA was checked using “brilcalc lumi”
- Shape-wise the distributions seems reasonable compared to 2016 analysis (taking into account the tighter cut on muon pt)
- The weights I’m applying are the one for the MC samples, the PU reweigthing and the product of the isolation and trigger efficiencies
- Any other ideas?

$H \rightarrow \tau\,\tau \rightarrow e/\mu\,\tau$

22 April 2018

Andrea Cardini

Backup