Systematic Uncertainty Study

Tau of TTTT

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IHEP Group Meeting, 2021

Outline

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List of systematic uncertainties for TTTT

Uncertainty source	**Type**
Luminosity	Norm
Cross section uncertainties	Norm
QCD (1tau0l) fake rate	Shape
Pileup	Shape
Level-1 ECAL prefiring	Shape
Trigger efficiency	Shape
Identification and isolation efficiency for e and mu	Shape
Identification efficiency for τ	Shape
Energy scale of e, mu and τ	Shape
Jet Identification	Shape
Jet energy scale	Shape
b-tag efficiency and mistag rate	Shape
Emiss resolution and response	Shape

Table: Systematic uncertainties

Luminosity

- https://twiki.cern.ch/twiki/bin/view/CMS/TWikiLUM
- uncorrelated effects and correlated effects?

	2016	**2017**	**2018**	**2016-2018**
Recommended luminosity [1/*fb*]	36.33	41.48	59.83	137.65
Recommended uncertainty	1.2	2.3	2.5	1.6

Prefiring reweighting

- taken into account only in 2016 and 2017 data-taking eras
- uncorrelated
- Shape uncertainty
- produce 2 additional templates filling the prefiring_up and prefiring_do while all the other weights are norminal value

Pileup systematic uncertainty

- The PU present in the Monte Carlo samples does not exactly match the PU present in the data.
- difference is corrected by reweighting simulated events to match the PU distribution in data
- reweight the all MC by pileupWeight_up and pileupWeight_down, rerun the whole analysis, get the distribution

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Adding lumilosity uncertainty

- `lumi_13TeV lnN 1.012 1.012 1.012 1.012 1.012 -`
- before: expected signficance 0.0719726; limit 27.3750
- after: expected significance 0.0672532; limit 29.3750
- Considering systematic uncertainties makes results worse as expected

Adding pileup reweighting uncertainty

Backup

back up