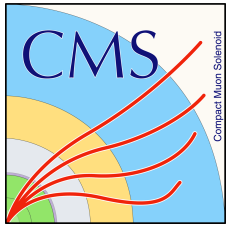
HEP NTUA
Weekly Report

10/11/2021

George Bakas



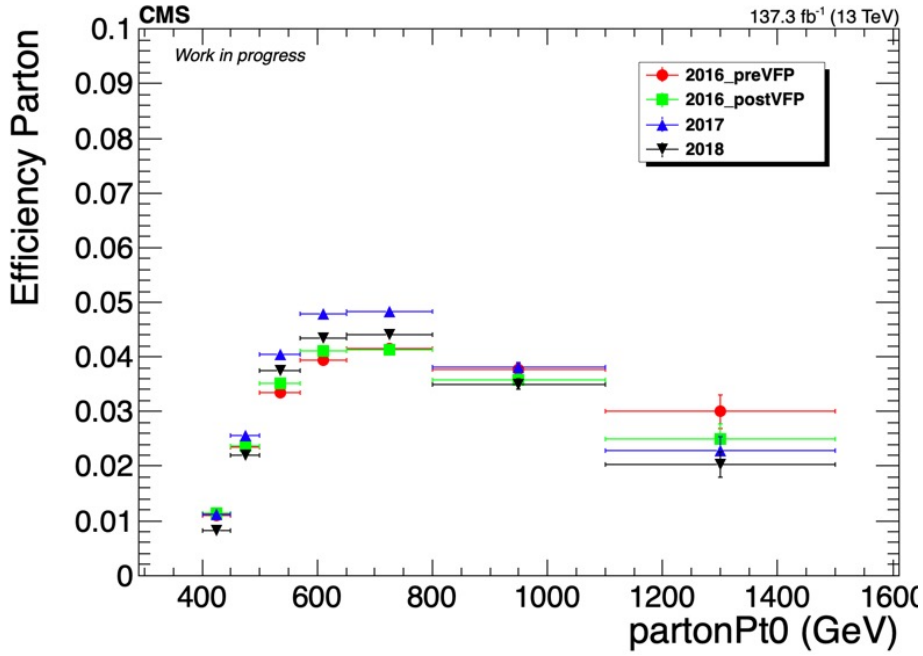
Summary

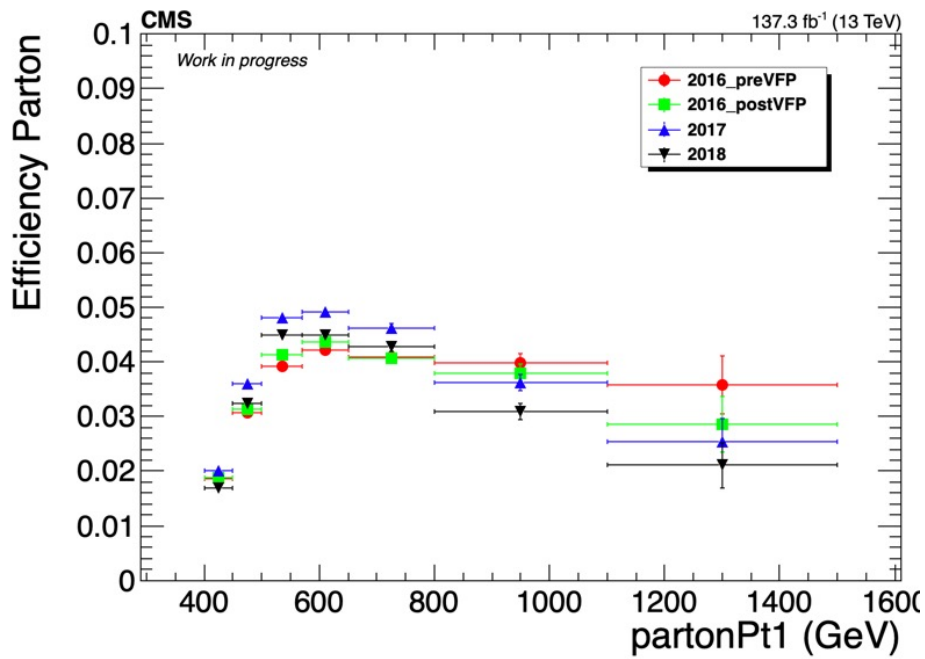
- ttX analysis:
  - Combination of all years in Fiducial level
  - Unfolding
    - Show systematic variations after unfolding for Parton and Particle levels
    - Unfold using the bulk sum of response matrices from all years
  - Combination of each variation in fiducial
    - Unfolding for each combined variation → combination of acceptance/efficiency and responses
  - ttX round table presentation on 27th of October
  - We have been writing the AN

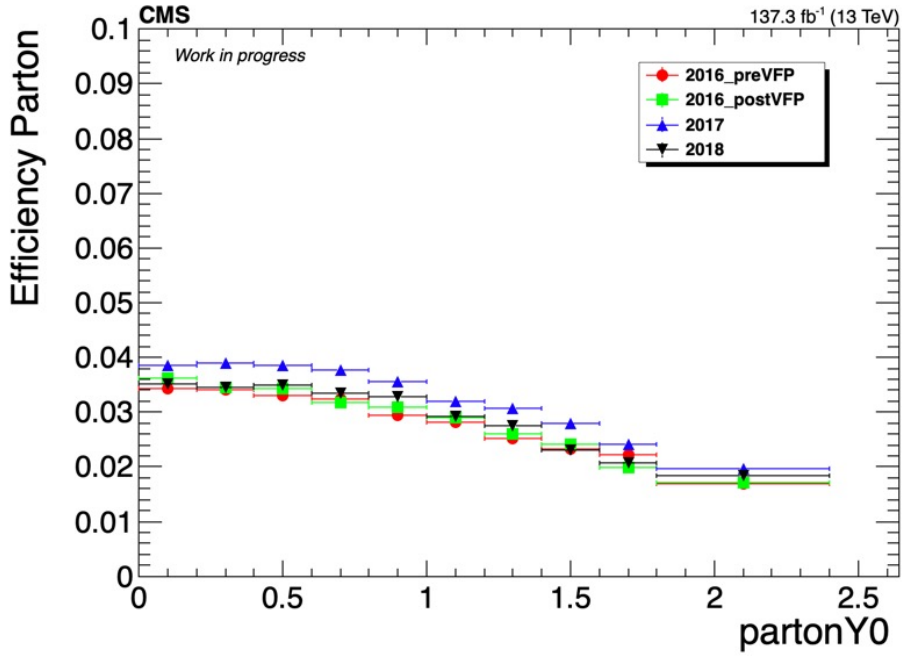
  - Systematic Variations
  - Theory variations
  - Efficiency & acceptance comparison
  - Kolmogorov testing Response matrices

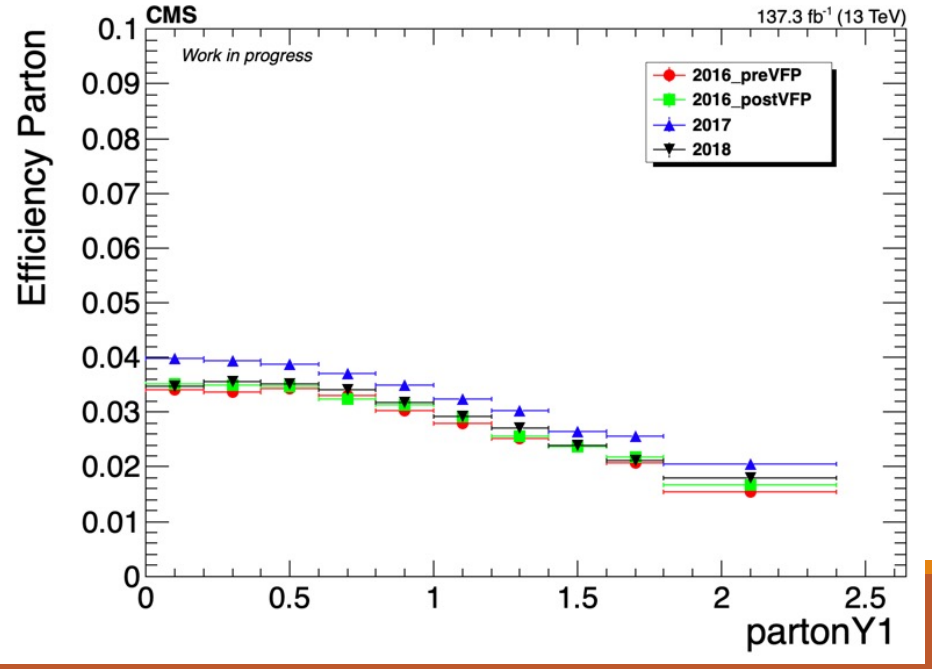
- Z' analysis
  - Writing documentation for PhD thesis

Efficiency Comparison

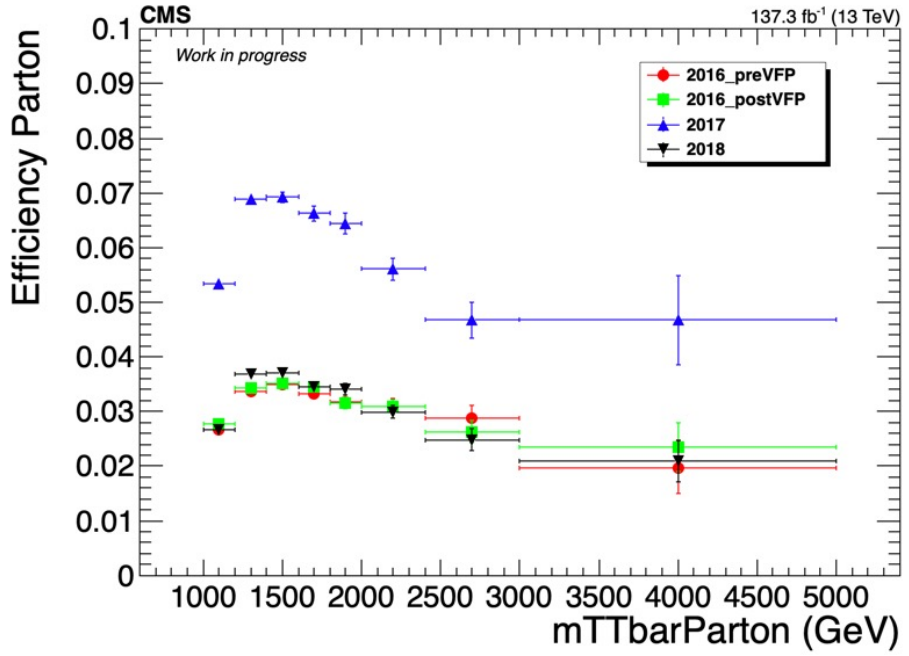


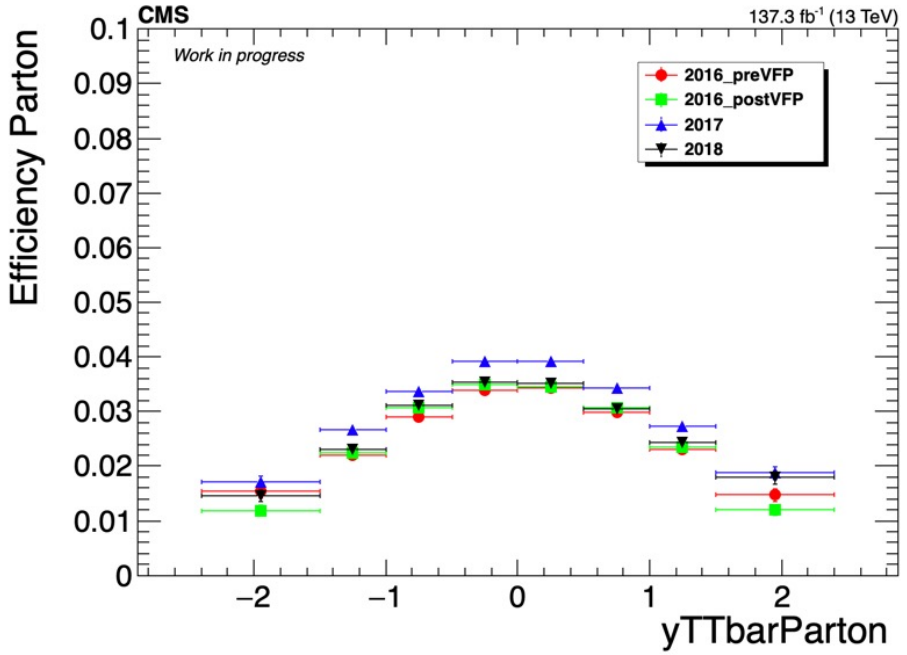


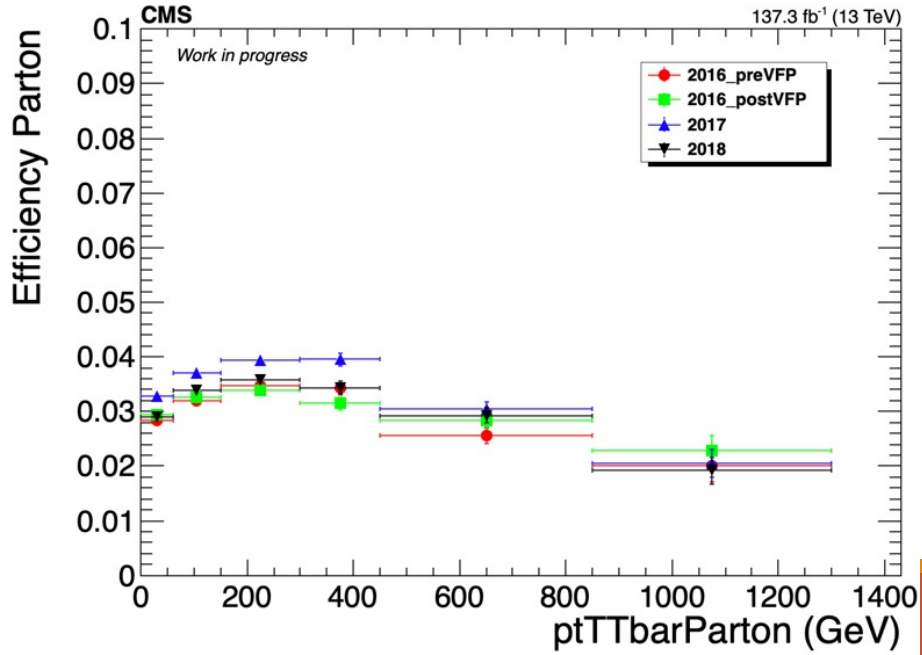




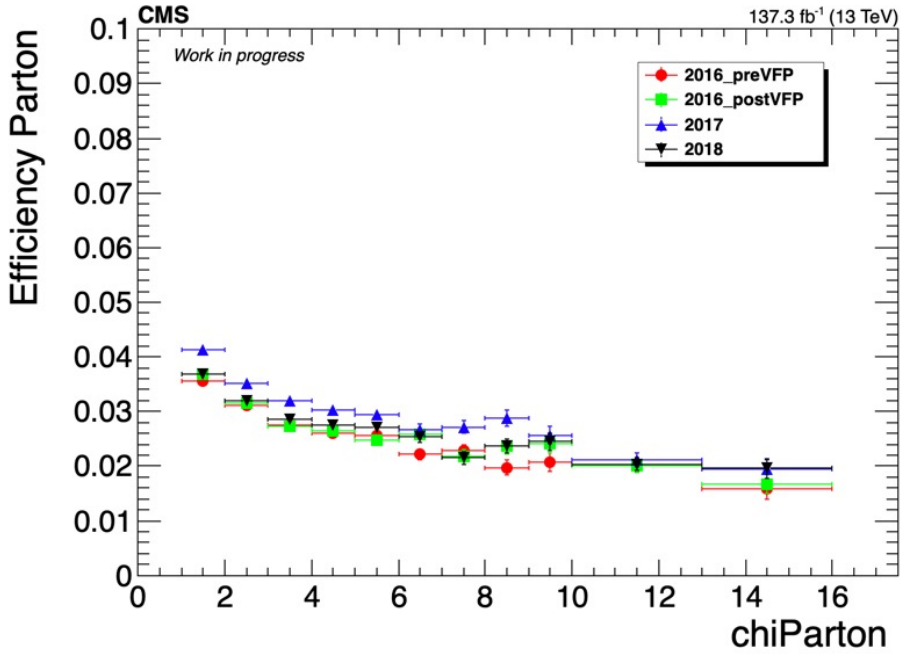
Efficiency Comparison

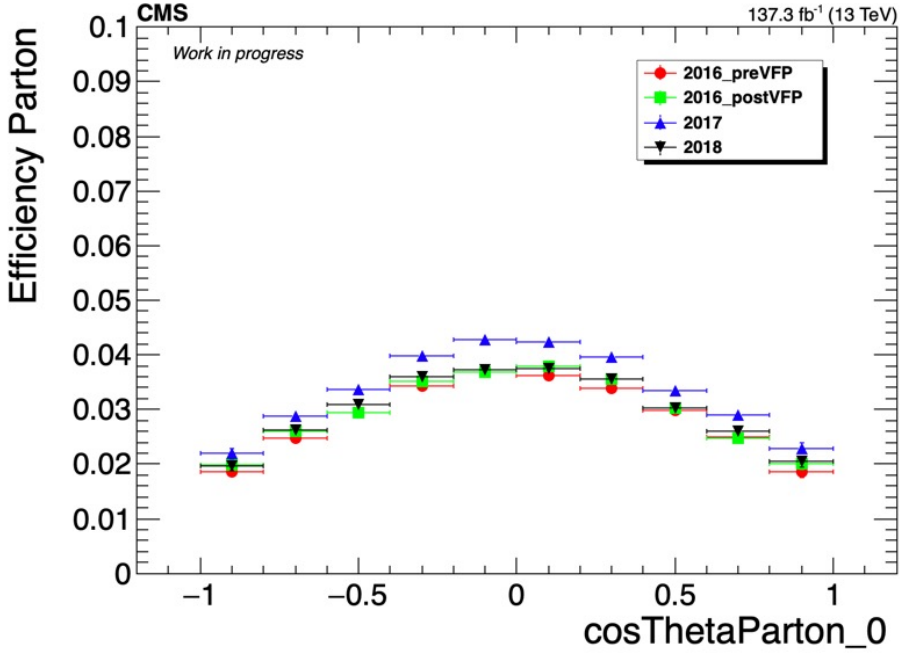


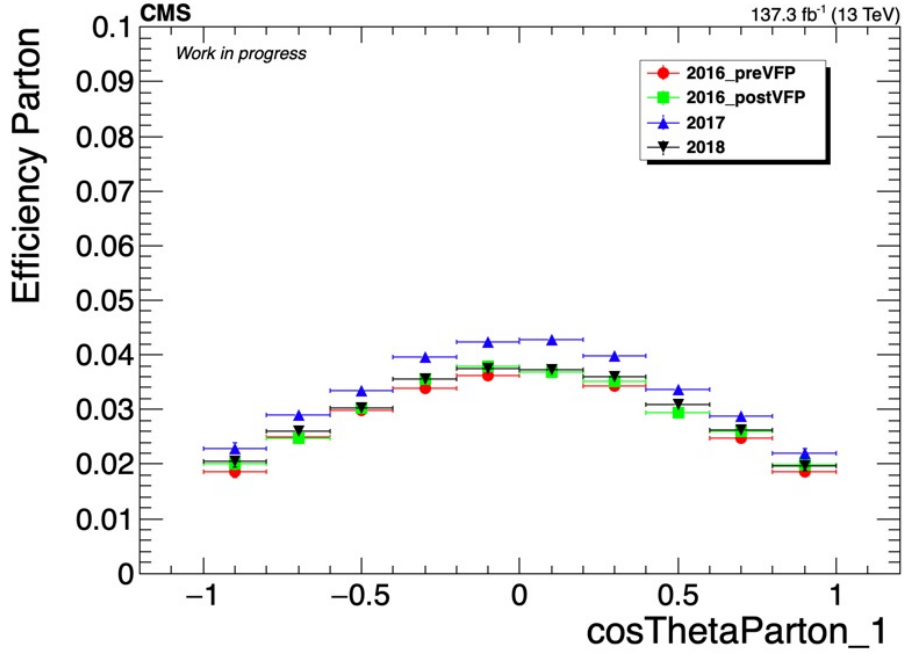




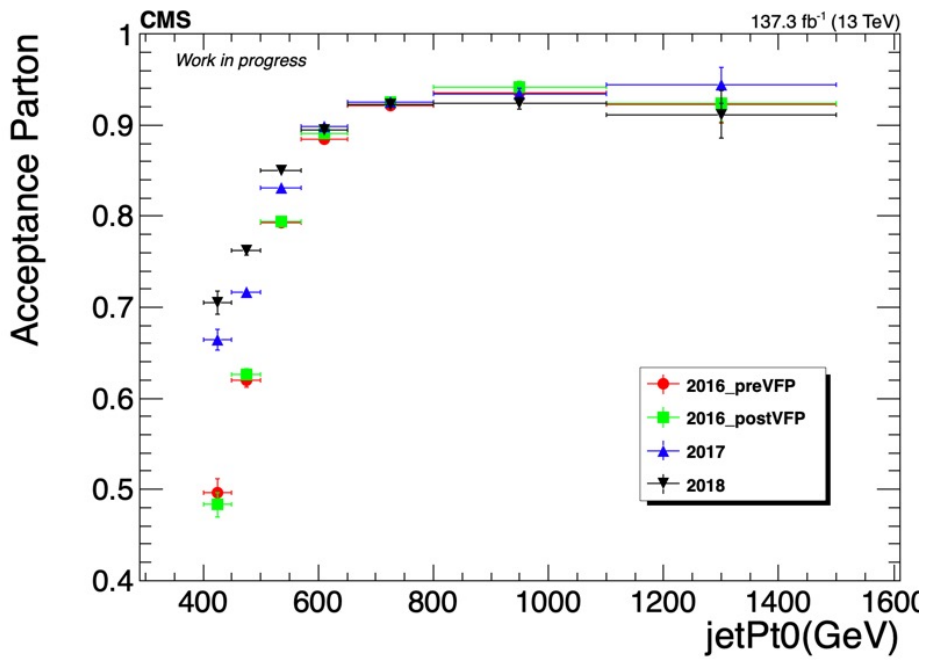
Efficiency Comparison

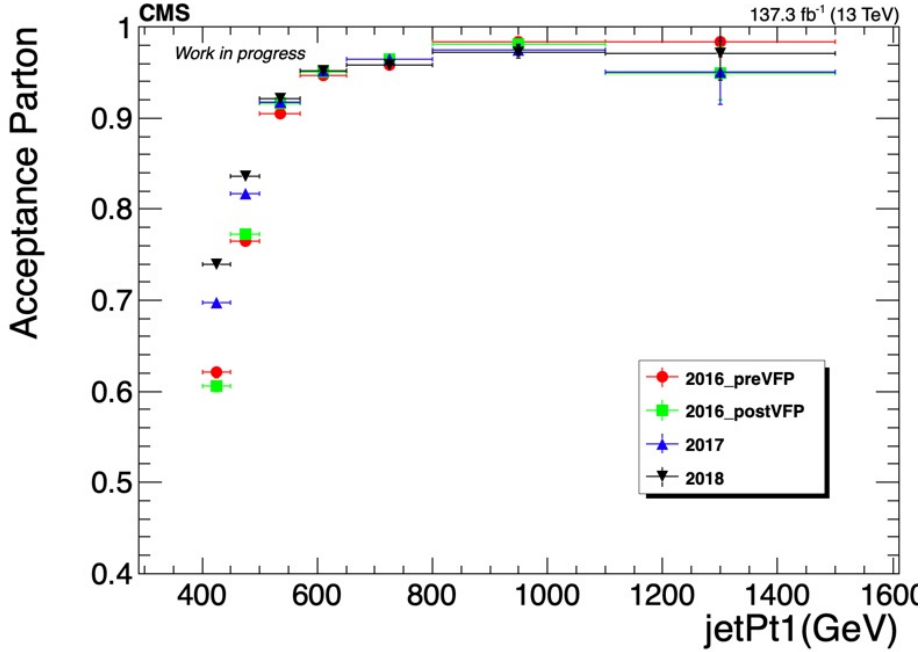


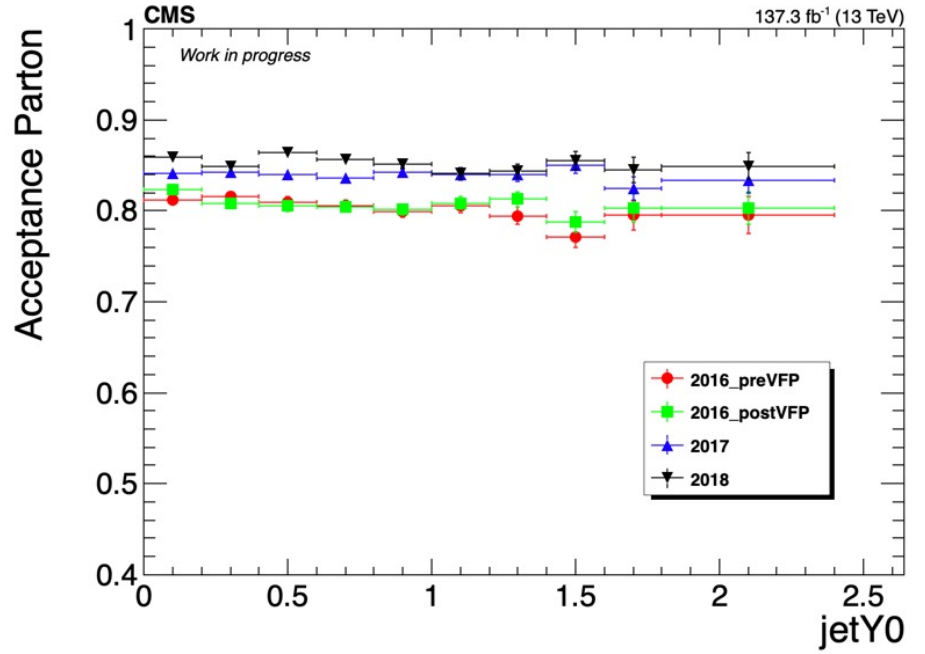


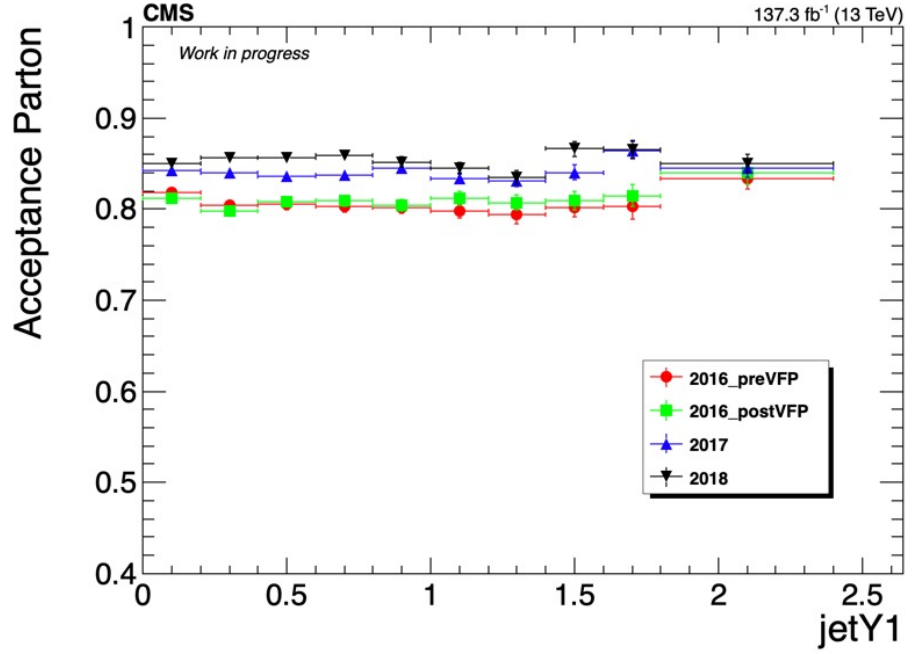


Acceptance Comparison

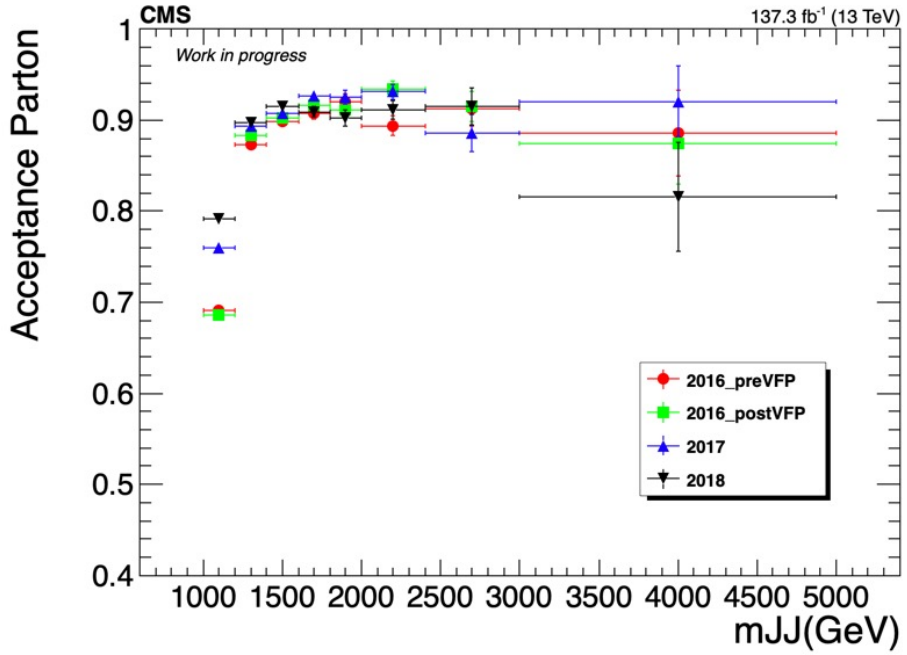


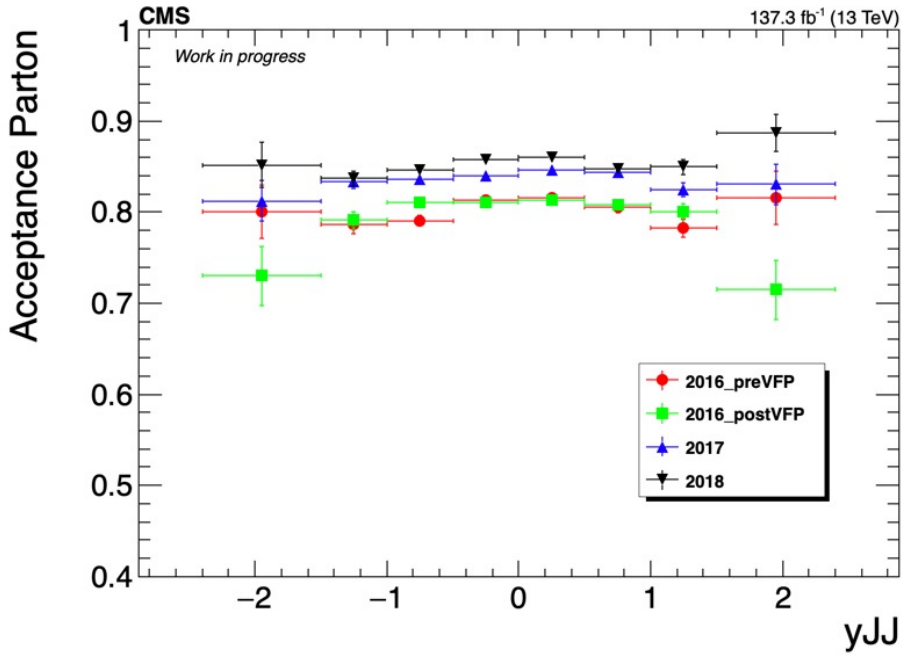


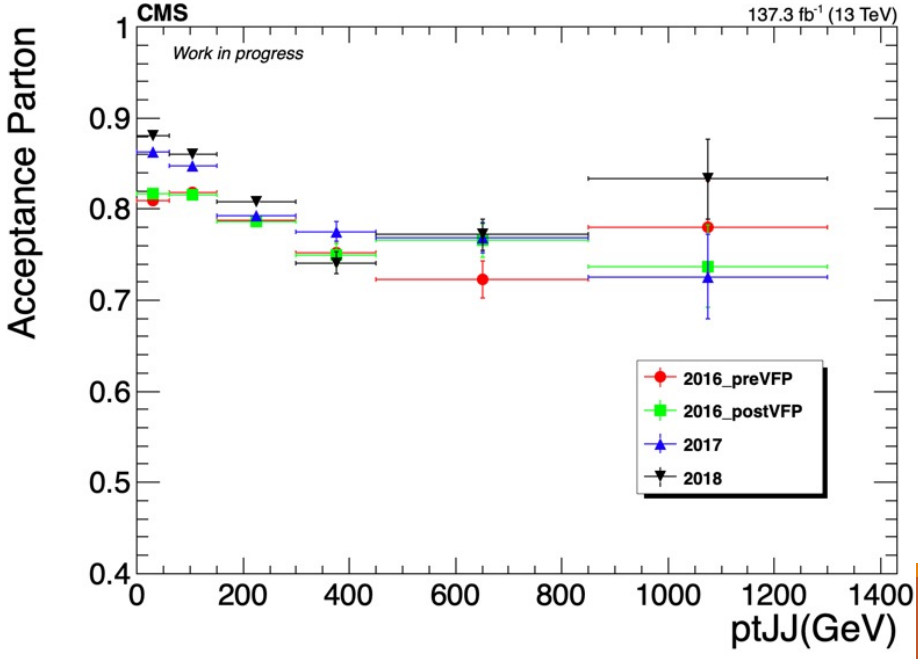




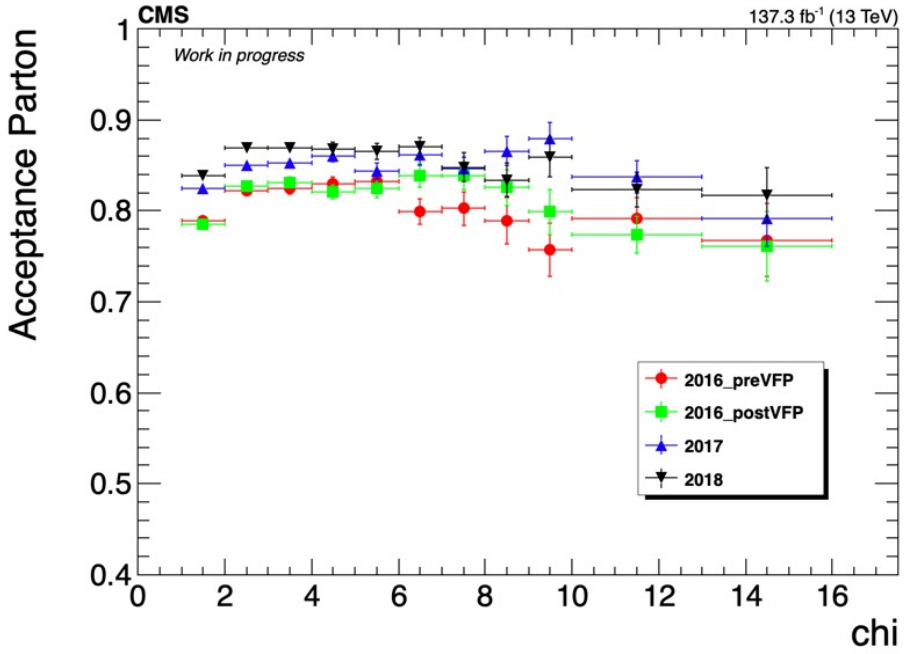
Acceptance Comparison

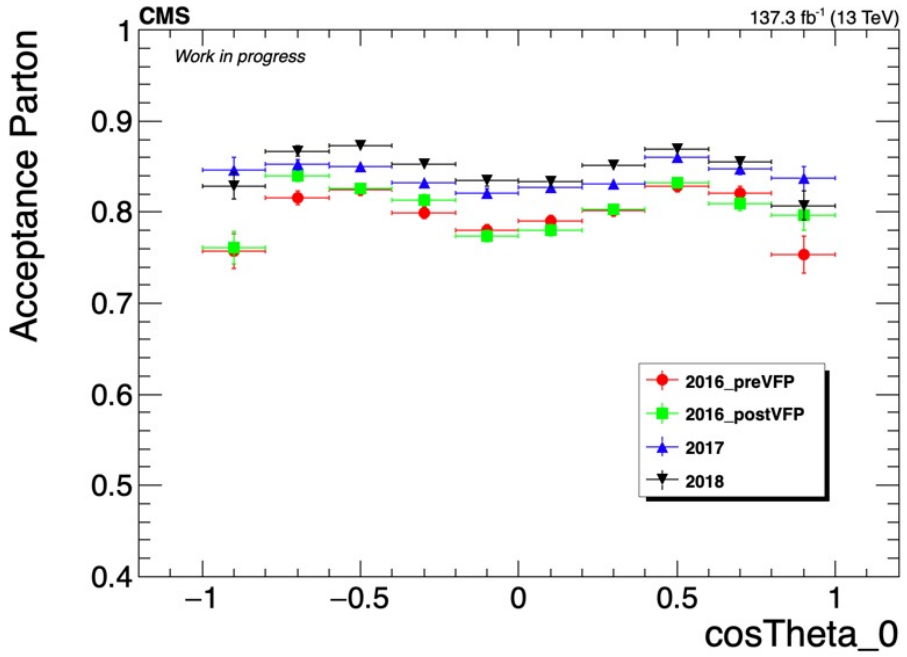


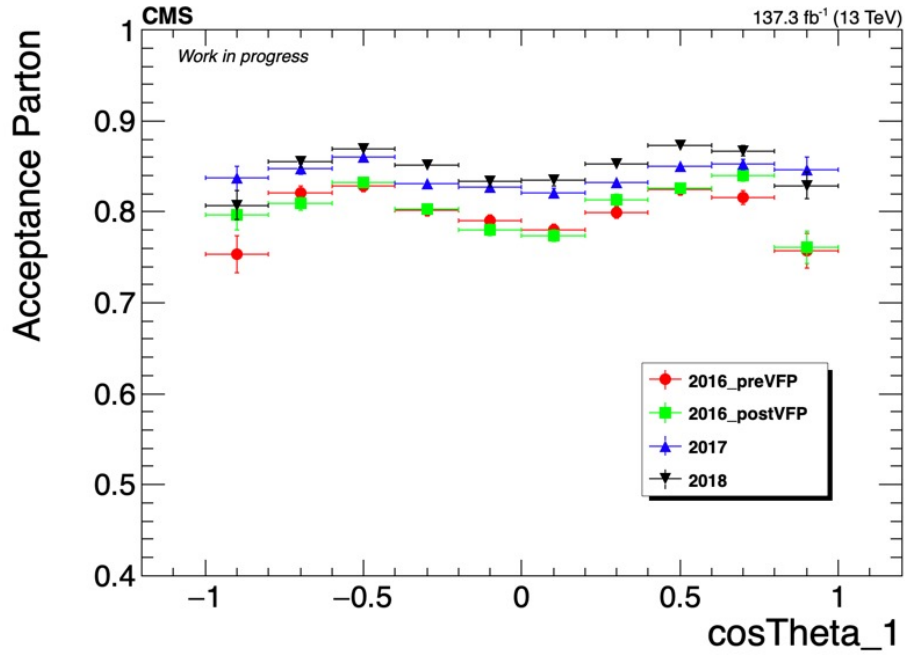




Acceptance Comparison







Kolmogorov Response matrices Tests mJJ

Statistical test of compatibility in shape between two histograms, using Kolmogorov test.
much less than one means NOT compatible

reference

	2016preVFP	2016postVFP	2017	2018
2016preVFP	1	1	0.0369	6.83e-05
2016postVFP	1	1	0.017	1.96e-05
2017	0.167	0.221	1	0.355
2018	0.029	0.058	0.619	1

Kolmogorov Response matrices Tests ptJJ

much less than one means NOT compatible

reference

	2016preVFP	2016postVFP	2017	2018
2016preVFP	1	1	0.258	0.538
2016postVFP	0.993	1	0.927	0.82
2017	0.547	1	1	0.963
2018	0.953	1	0.996	1

Kolmogorov Response matrices Tests yJJ

much less than one means NOT compatible

reference

	2016preVFP	2016postVFP	2017	2018
2016preVFP	1	1	1	1
2016postVFP	1	1	1	1
2017	1	1	1	1
2018	1	1	1	1

Kolmogorov Response matrices Tests jetPt0

much less than one means NOT compatible

reference

	2016preVFP	2016postVFP	2017	2018
2016preVFP	1	1	0.009	7.52e-07
2016postVFP	1	1	0.023	2.049e-06
2017	0.07	0.25	1	0.216
2018	0.005	0.029	0.454	1

Kolmogorov Response matrices Tests chi

much less than one means NOT compatible

reference

	2016preVFP	2016postVFP	2017	2018
2016preVFP	1	1	1	1
2016postVFP	1	1	1	0.985
2017	1	1	1	1
2018	1	1	1	1

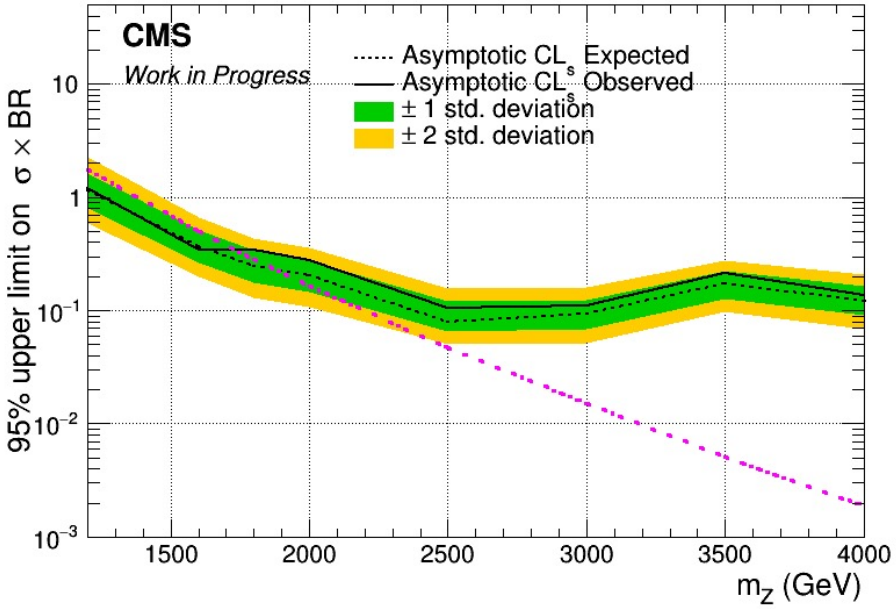
BACKUP

Summary

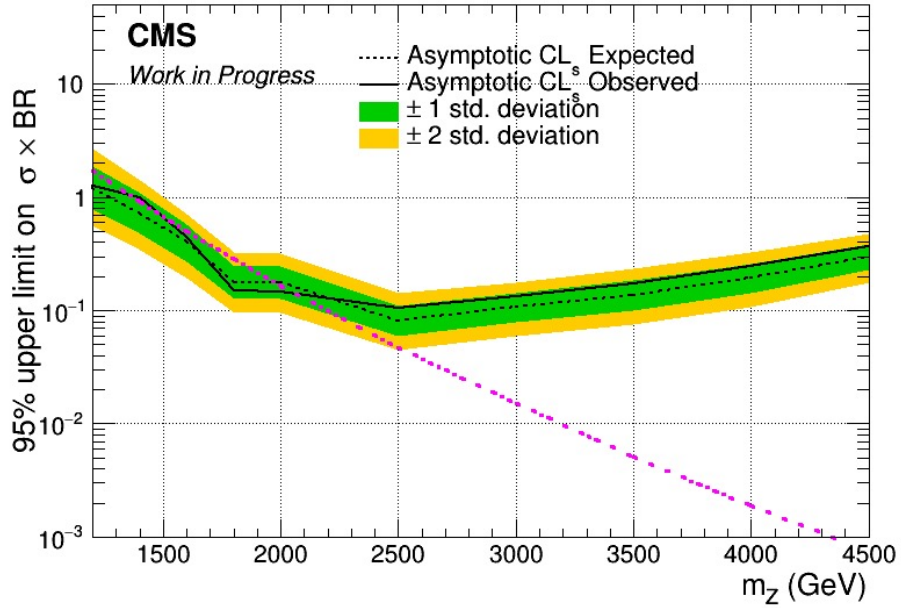
- ttX analysis Pipeline Creation
  1. We want to be able to handle all Nominal files and their variations in an automated way
  2. This requires deciding consistent naming conventions and a efficient planning
  3. Handling of:
     1. Nominal
     2. Parton Shower Weights
     3. PDF Variations
     4. JES
     5. Scale Variations
     6. bTagVariations
     7. Top quark mass variations
  4. Per year For all these we need to
     1. Create template files that have 2btag and 0btag in Extended and Reduced jetMassSoftDrop phase space
     2. 9 variables (mJJ, pTJJ, yJJ, jetPt[0,1], jetY[0,1], chi, |cosTheta*|[0,1]
     3. Template fit files (bkg qcd, bkg subdominant) and signal templates for all variations
     4. Fit on extended signal region for all variations
     5. Response matrices, Acceptance, Efficiency
     6. Signal Extraction
  5. Combine all Fiducial Level results (4 years) into 1 Extracted Signal for all variations
  6. Unfold the combined result into **Parton & Particle** levels
  7. Show systematic variations compared to the Nominal file
  8. The same procedure must be done using different nominal files
     1. Fill in 2btag histograms in our signal region in the parton
     2. For each variation and each year
     3. Combine all years together
     4. Calculate systematics for samples other than the nominal

Brazilian Plots (2016_preVFP, 2017 and 2018) with sliding mJJ Cut

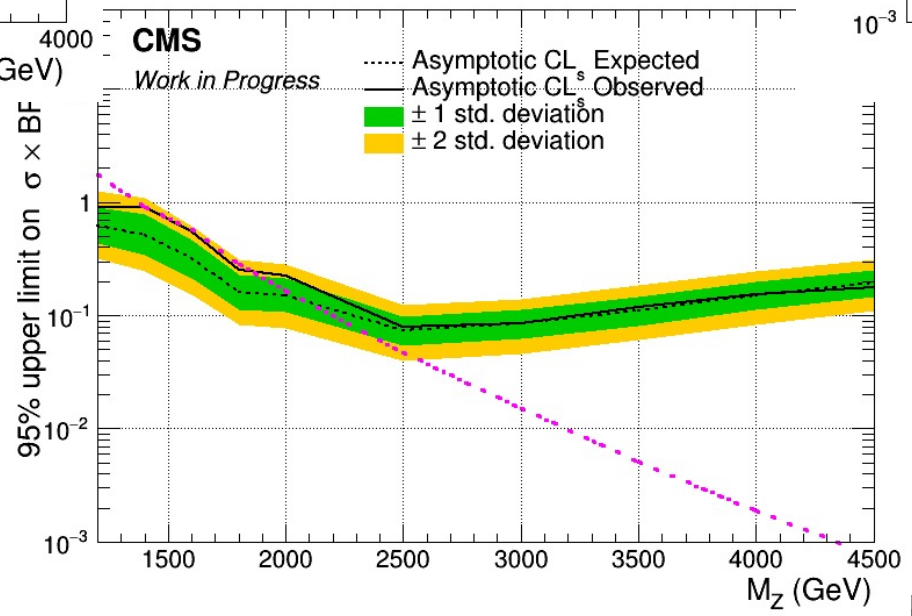
2016_preVFP



2017



2018



Combined Datacard for 2016_preVFP, 2017 and 2018

Mass Cut Mapping

{"mZ_1200_12":1000, "mZ_1400_14":1200, "mZ_1600_16":1400, "mZ_1800_18":1600, "mZ_2000_20":1600,
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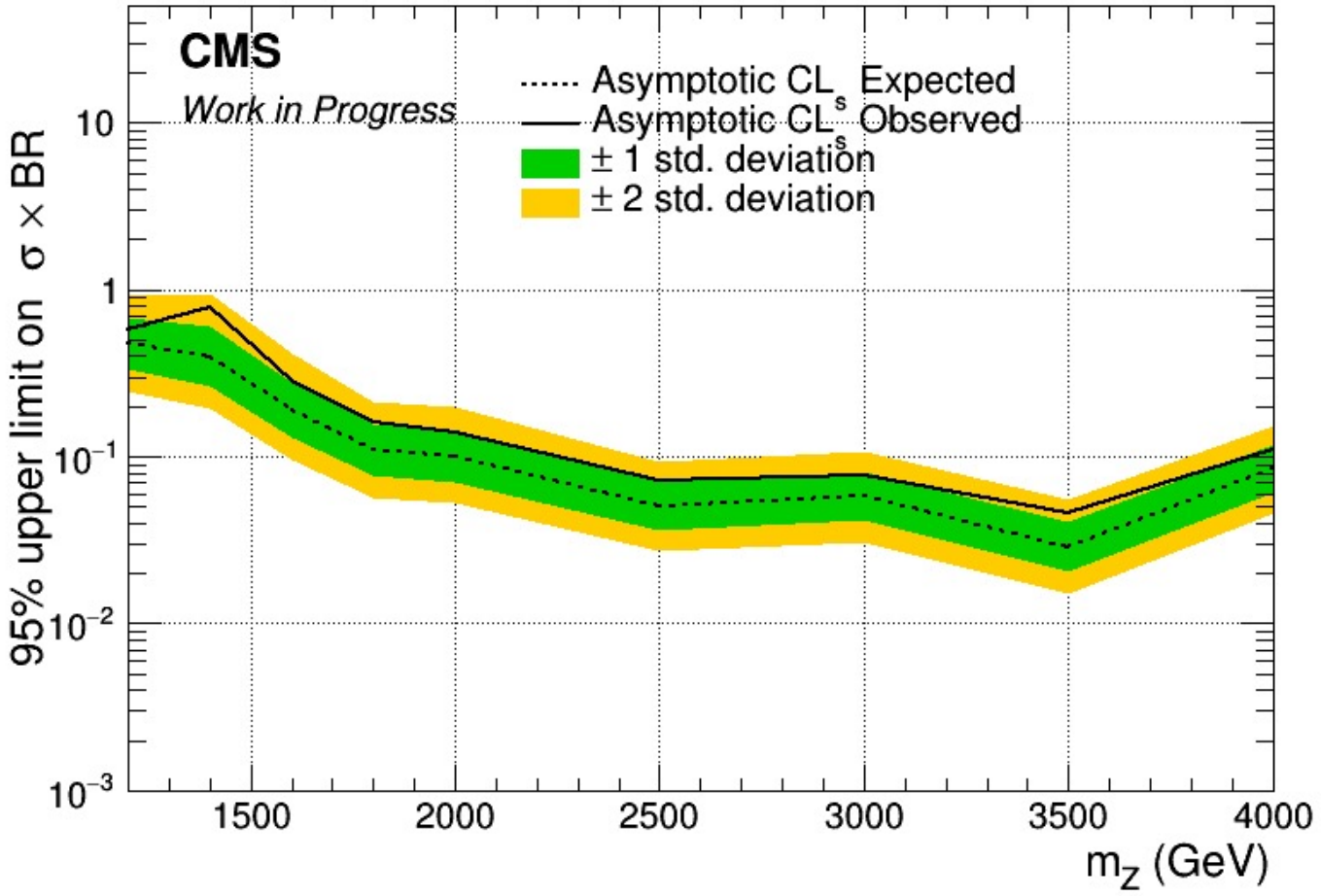
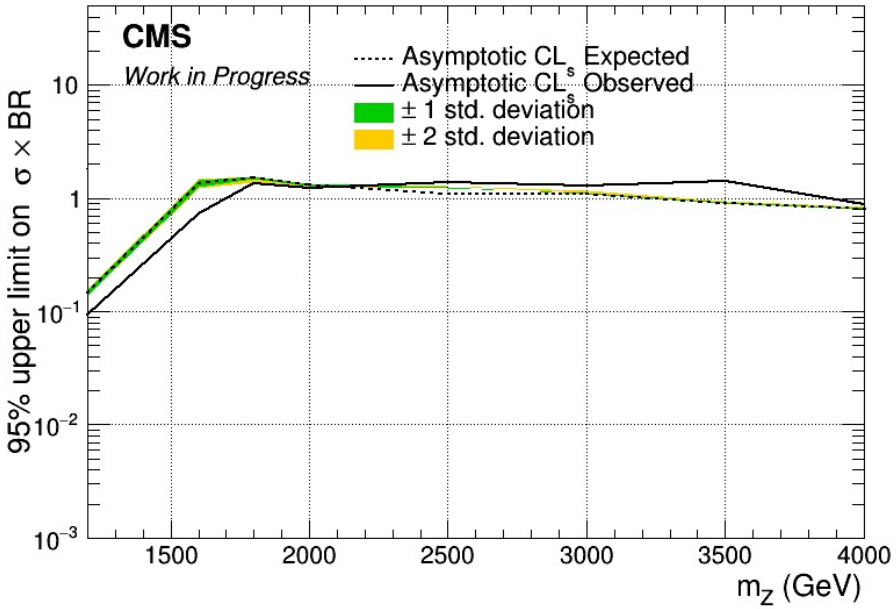
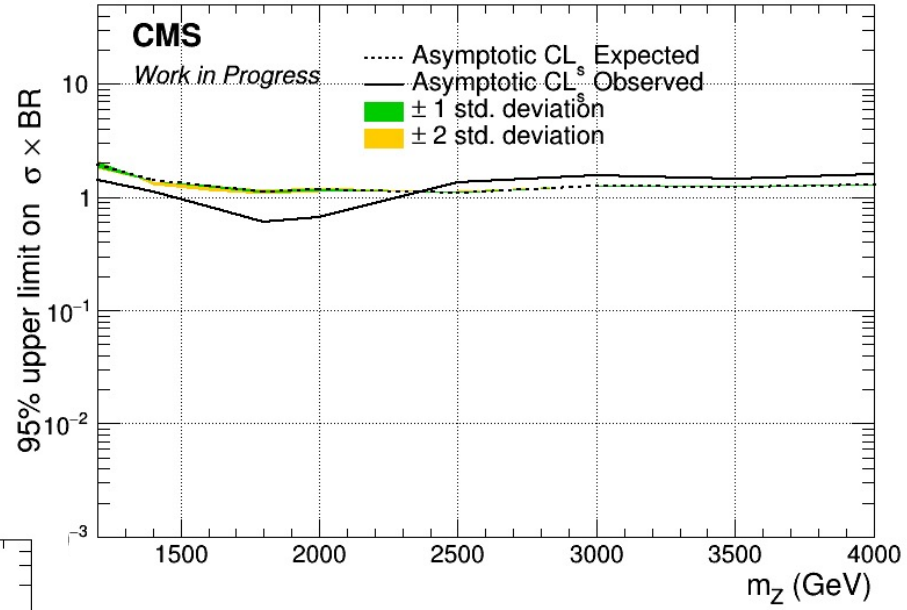


Brazilian Plots (2016_preVFP, 2017 and 2018) with sliding mJJ Cut wrt 2018

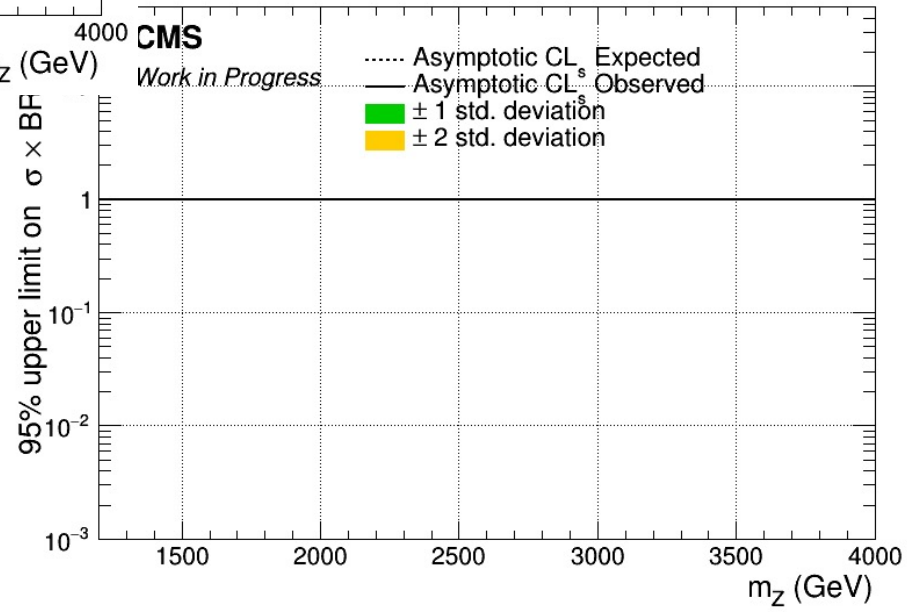
2016_preVFP



2017



2018



Combined Datacard for 2016_preVFP, 2017 and 2018 wrt 2018

Mass Cut Mapping

{"mZ_1200_12":1000, "mZ_1400_14":1200, "mZ_1600_16":1400, "mZ_1800_18":1600, "mZ_2000_20":1600,
"mZ_2500_25":2000, "mZ_3000_30":2000, "mZ_3500_35":2000, "mZ_4000_40":2000, "mZ_4500_45":2000}