First 36.381/fb of 2018 data in diphoton channel + Data/MC comparison

Uzziel Perez

University of Alabama

2018

Overview

- Dataset up to 24.089/fb
- Latest dataset

2018 Data Processing

- CMSSW_10_1_1
- GT: 101X_dataRun2_Prompt_v9
- Datasets:
  - /EGamma/Run2018A-PromptReco-v1/MINIAOD
  - /EGamma/Run2018A-PromptReco-v2/MINIAOD
  - /EGamma/Run2018A-PromptReco-v3/MINIAOD
  - /EGamma/Run2018B-PromptReco-v1/MINIAOD
  - /EGamma/Run2018B-PromptReco-v2/MINIAOD
  - /EGamma/Run2018C-PromptReco-v1/MINIAOD
  - /EGamma/Run2018C-PromptReco-v2/MINIAOD

2018 Data Processing

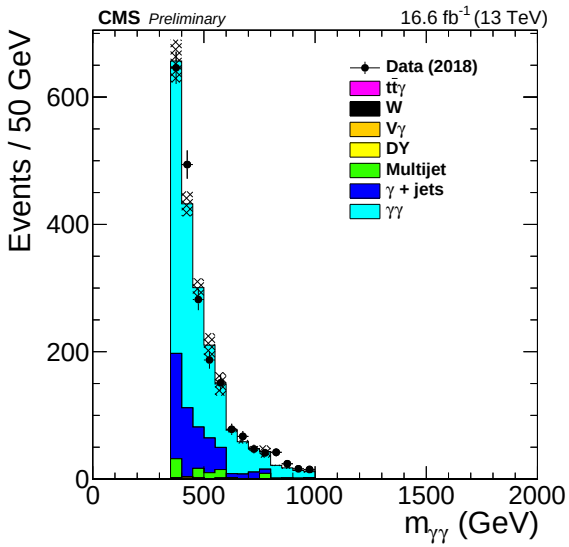
- Good Run JSON:
  Cert_314472-319851_13TeV_PromptReco_Collisions18_JSON.txt
  Previous up to 318876
- Selection:
  - Trigger: HLT_DoublePhoton70
  - $p_T > 125$ GeV
  - $m_{\gamma\gamma} > 500$ GeV
  - High p_T photon ID v2

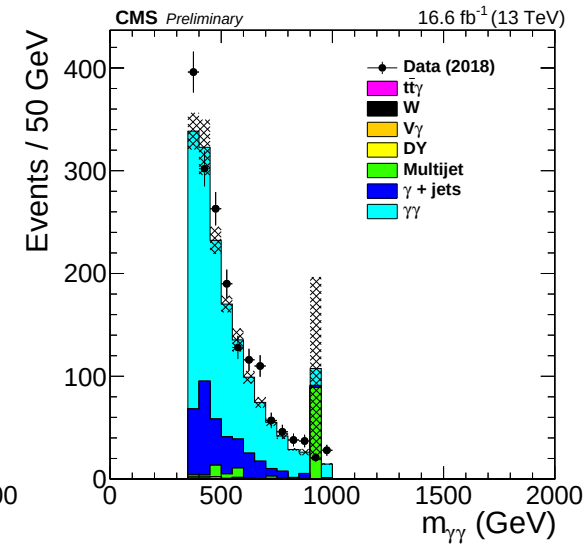
Data/MC Comparisons: $m_{\gamma\gamma}$

- *Includes NNLO k-factor applied to $m_{\gamma\gamma}$ as in 2016 analysis, but with modified p_T cut
  - *k-factor calculated with $p_T > 125$ GeV and $m_{\gamma}\gamma > 500$ GeV
- *New 2018 data indicates the latest certified data

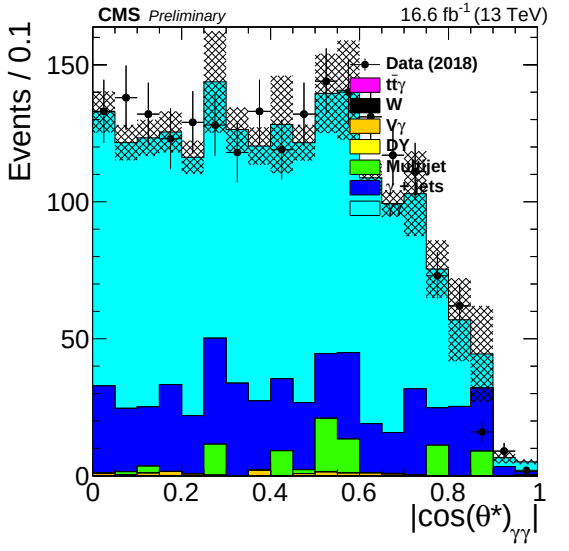
*Notes from Chris' slides

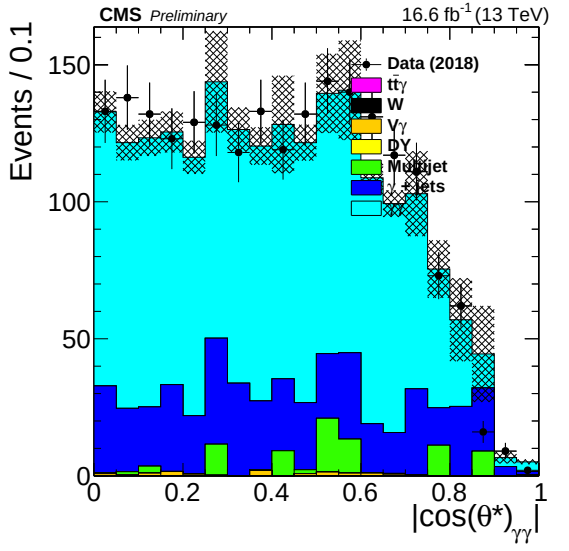
Full 2018 dataset





New 2018 data





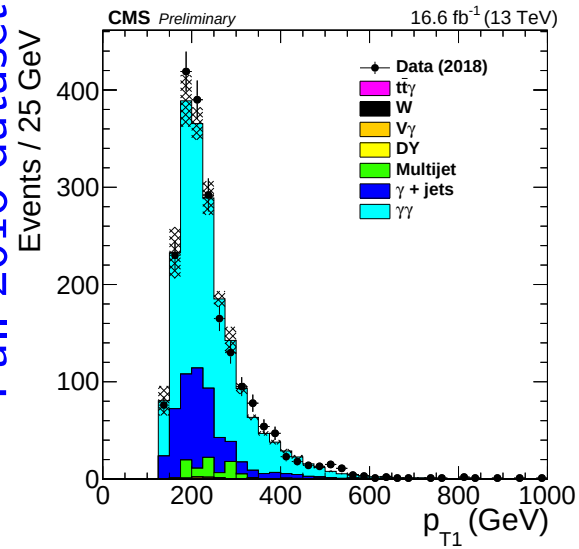
Barrel-Barrel

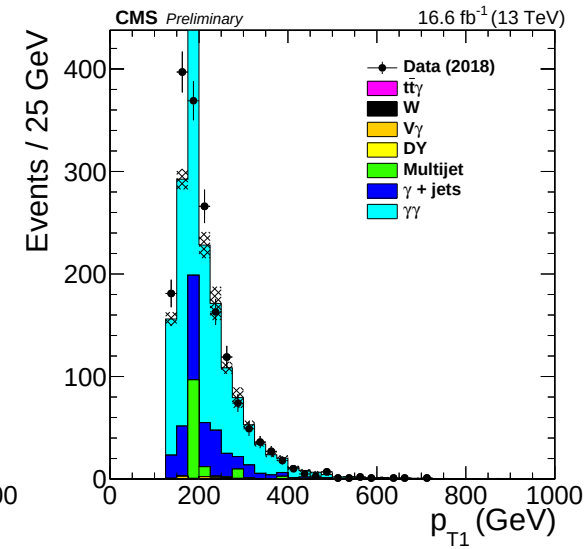
Barrel-Endcap

Data/MC Comparisons: p_{T1}

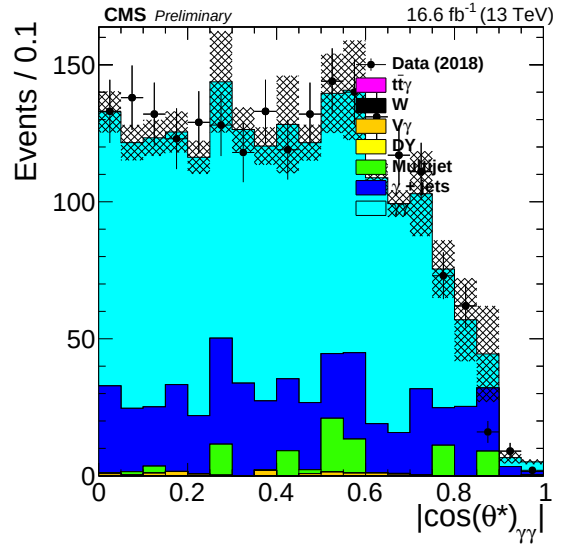
- Same as before

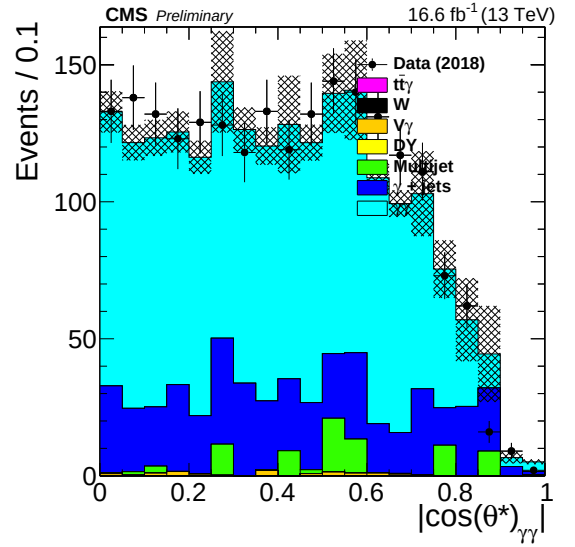
Full 2018 dataset





New 2018 data



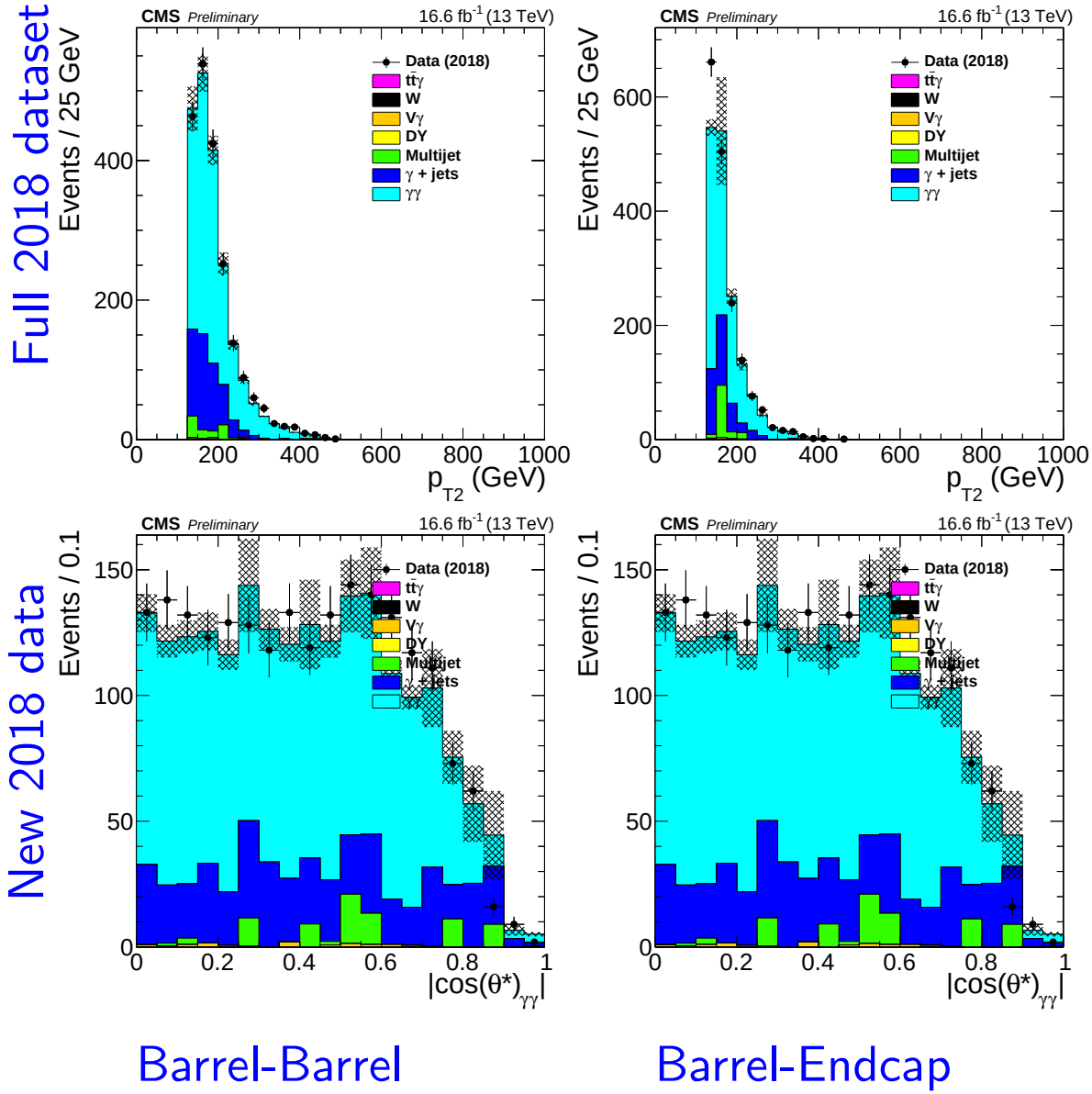


Barrel-Barrel

Barrel-Endcap

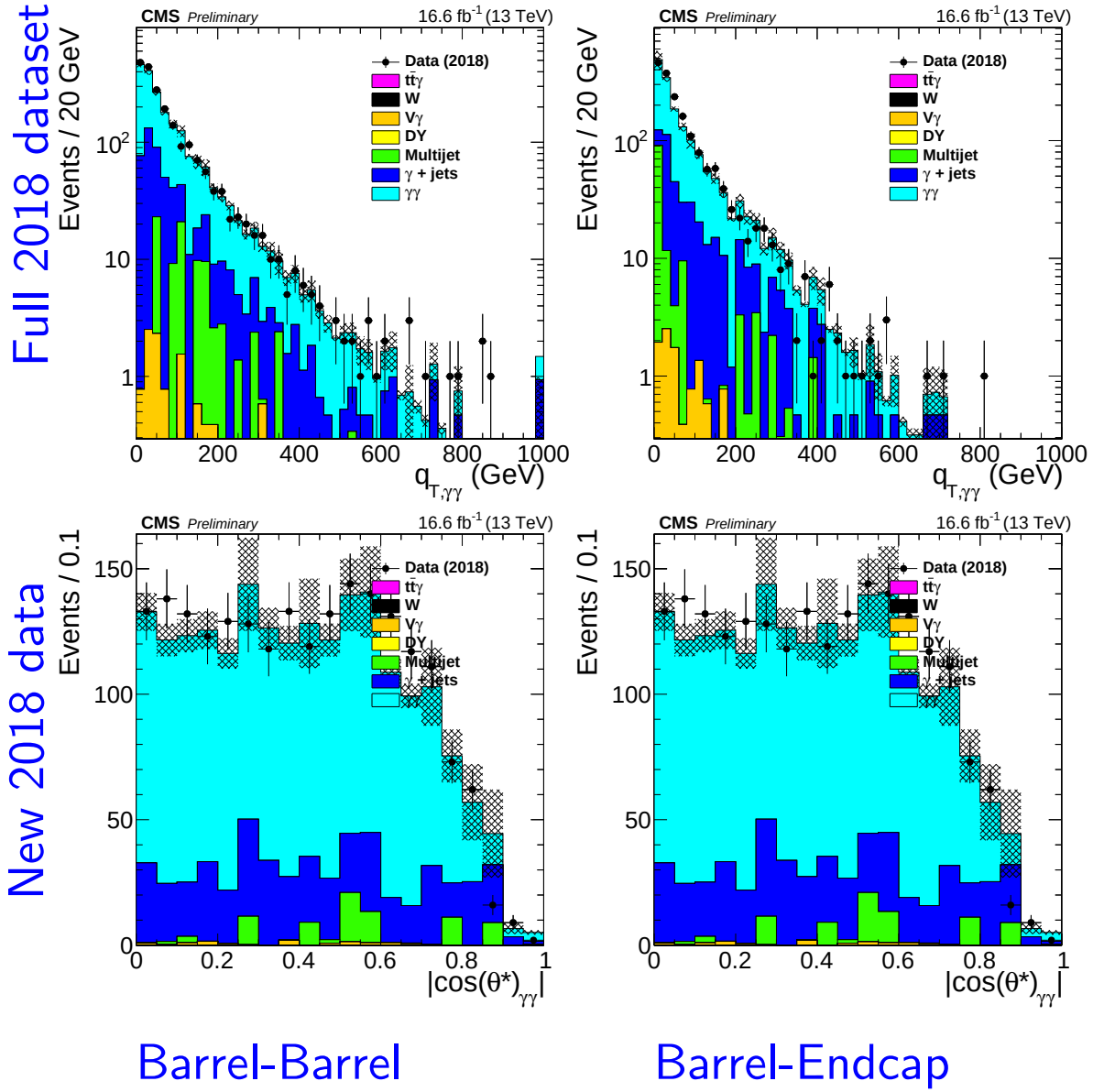
Data/MC Comparisons: p_{T2}

- Same as before



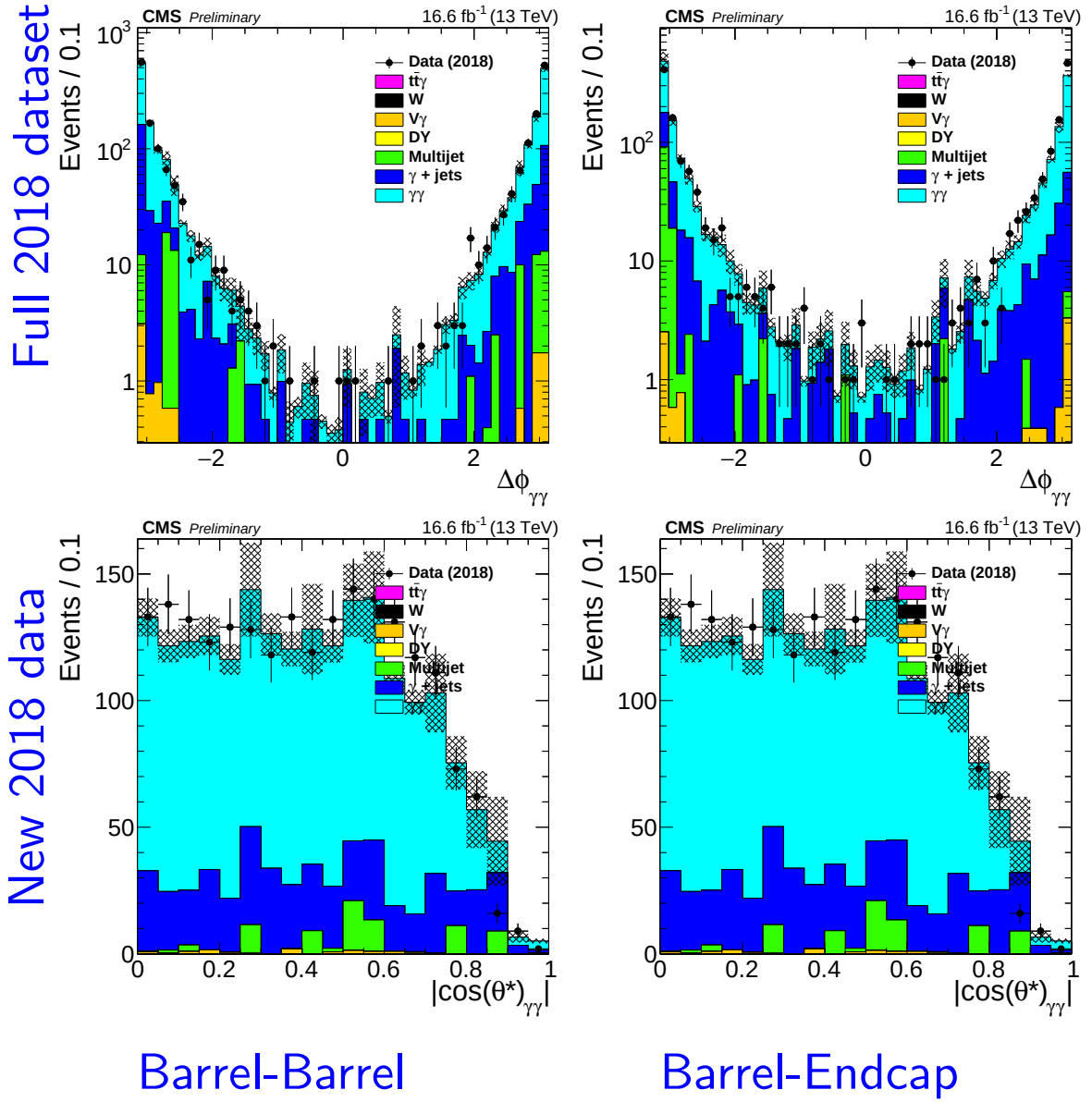
Data/MC Comparisons: $q_{T\gamma\gamma}$

- Considerably good agreement



Data/MC Comparisons: $\Delta\phi_{\gamma\gamma}$

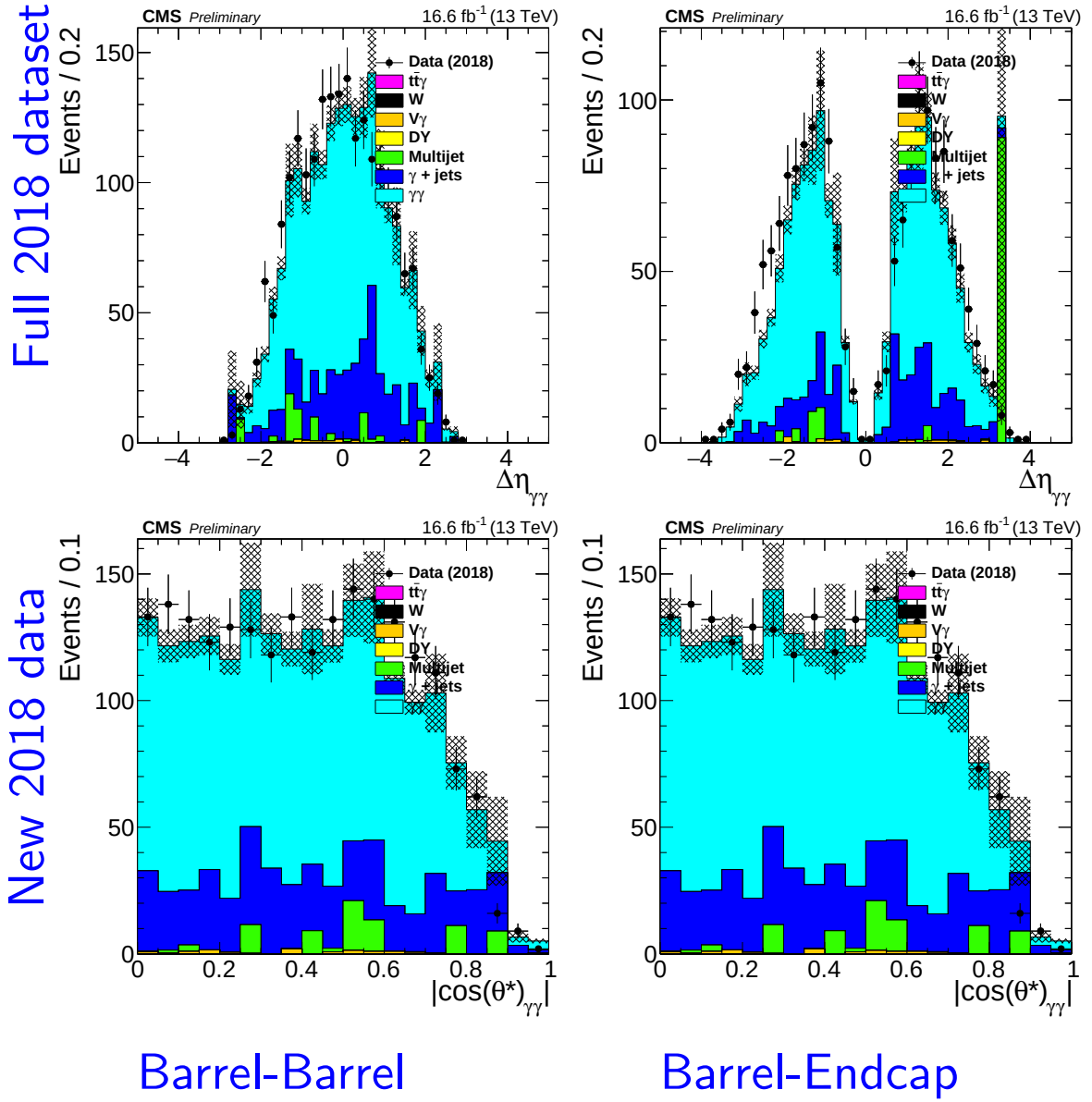
- Considerably good agreement



Data/MC Comparisons: $\Delta\eta_{\gamma\gamma}$

- *Slight discrepancy at negative $\Delta\eta = \eta_1 - \eta_2$ in barrel-endcap case

*Notes from Chris' slides



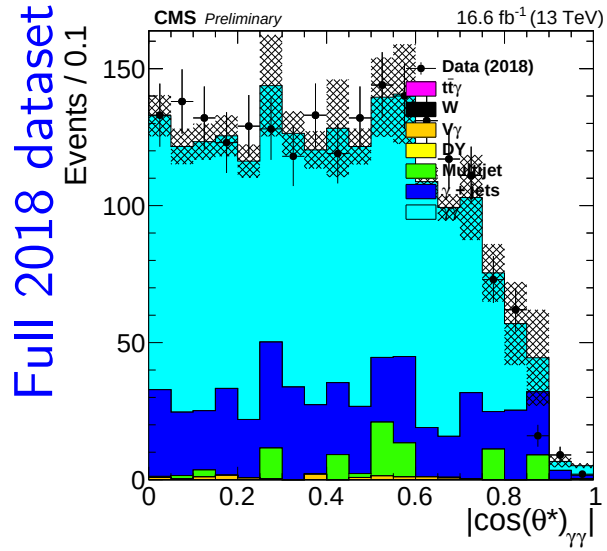
Data/MC Comparisons: $|\cos\theta^*_{\gamma\gamma}|$

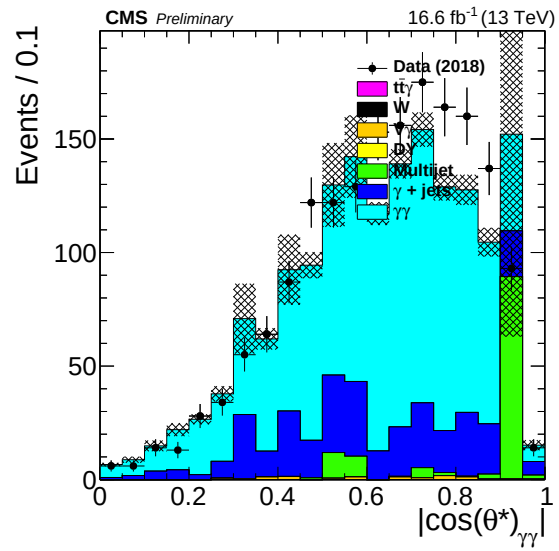
- *Some disagreement at high $|\cos\theta^*_{\gamma\gamma}|$

*Notes from Chris' slides

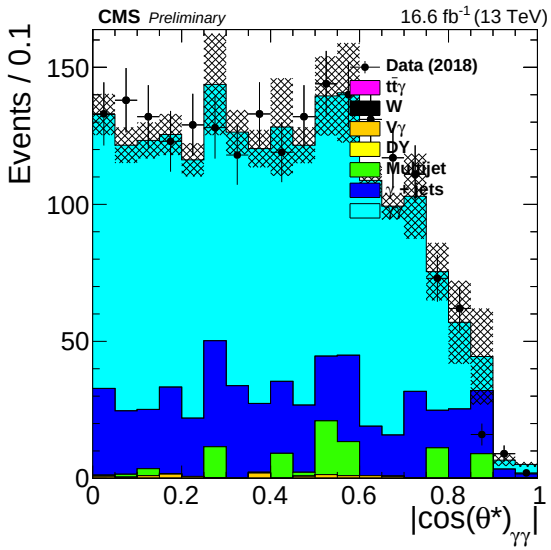
Full 2018 dataset

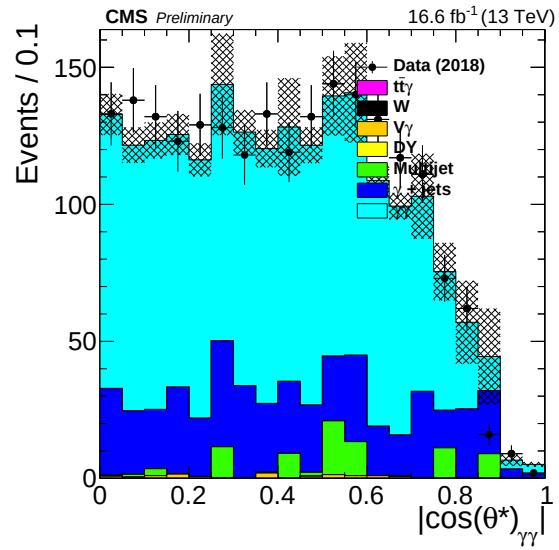
New 2018 data





Barrel-Barrel





Barrel-Endcap

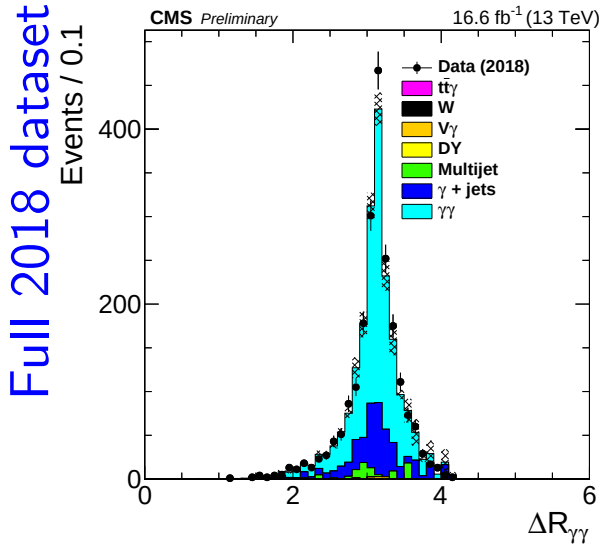
Data/MC Comparisons: $\Delta R_{\gamma\gamma}$

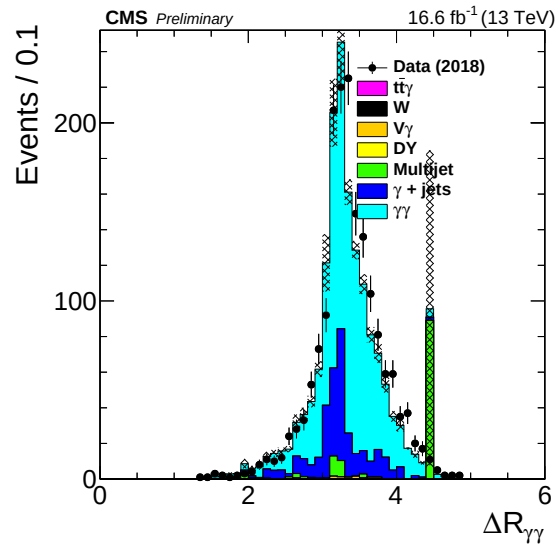
- *Some disagreement at high $\Delta R_{\gamma\gamma}$

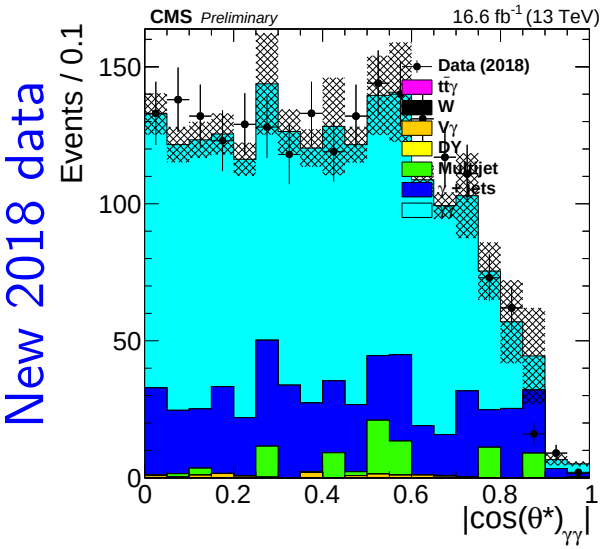
*Notes from Chris' slides

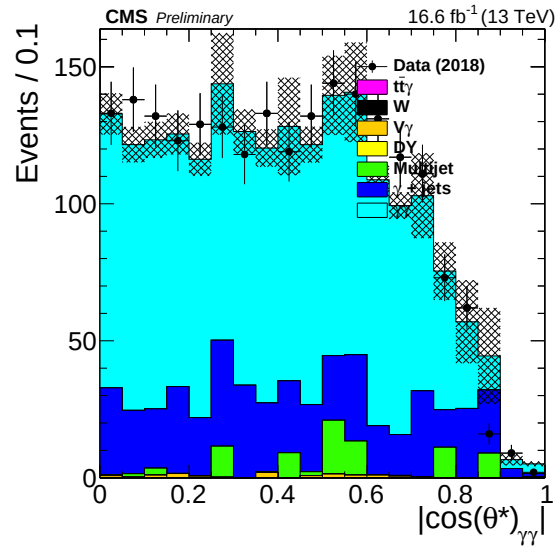
Full 2018 dataset

New 2018 data









Barrel-Barrel

Barrel-Endcap

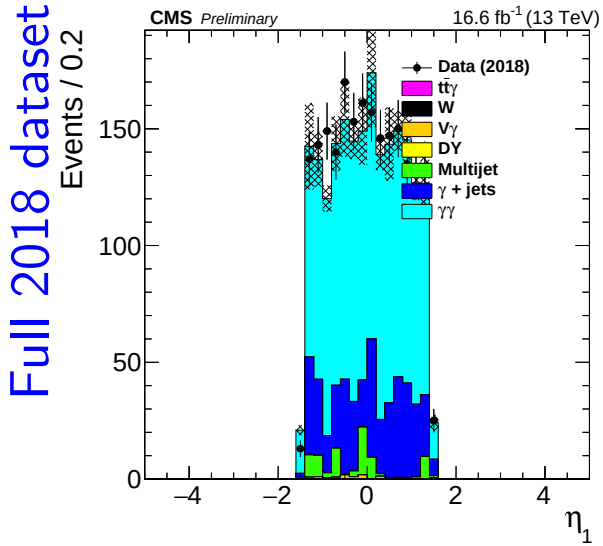
Data/MC Comparisons: η_1

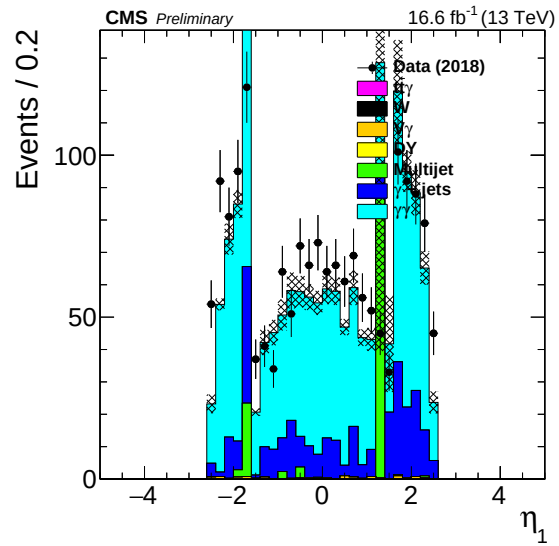
- *Fake rate higher in EE-?

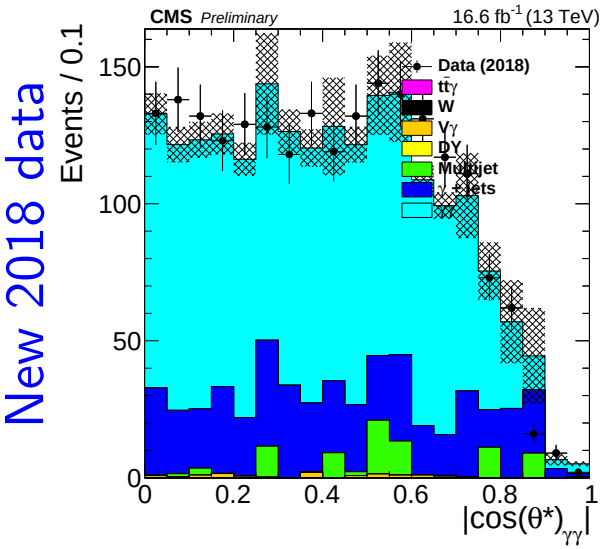
*Notes from Chris' slides

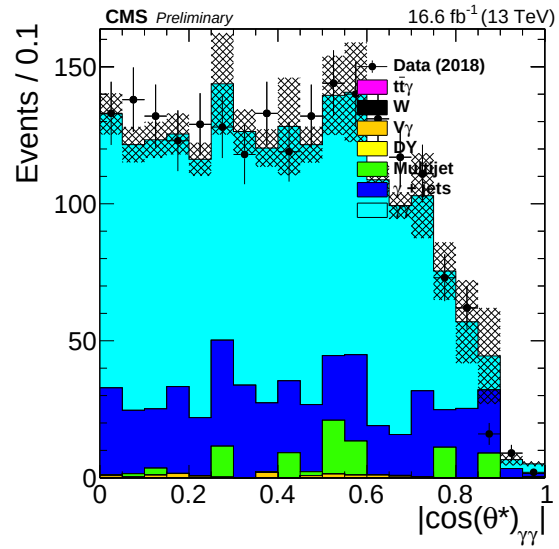
Full 2018 dataset

New 2018 data









Barrel-Barrel

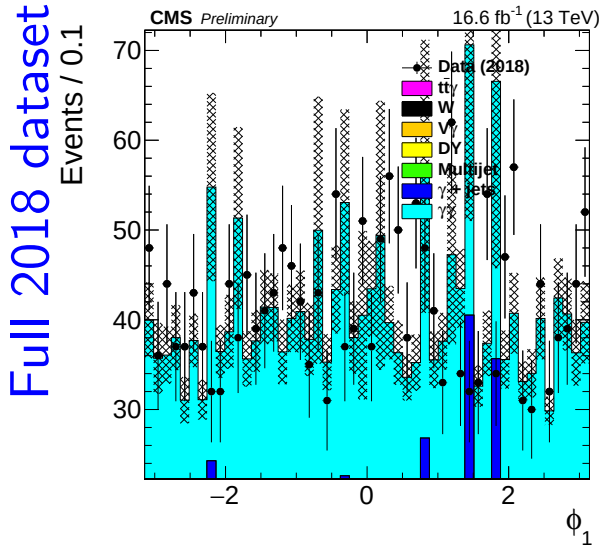
Barrel-Endcap

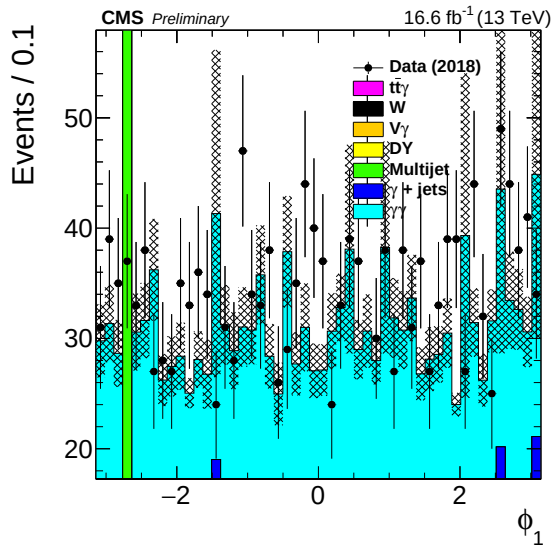
Data/MC Comparisons: ϕ_1

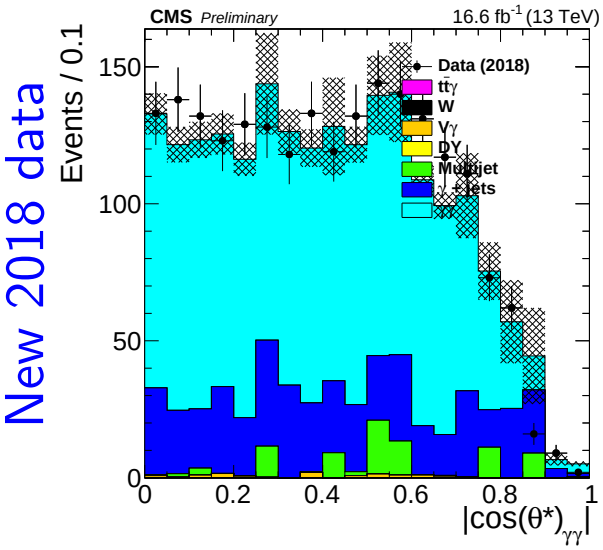
- Flat

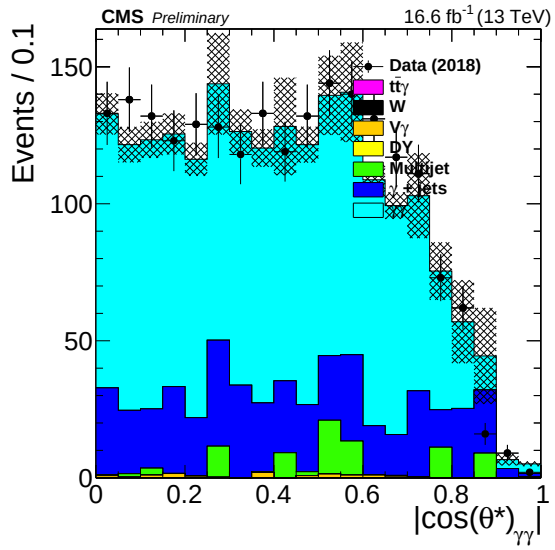
Full 2018 dataset

New 2018 data









Barrel-Barrel

Barrel-Endcap

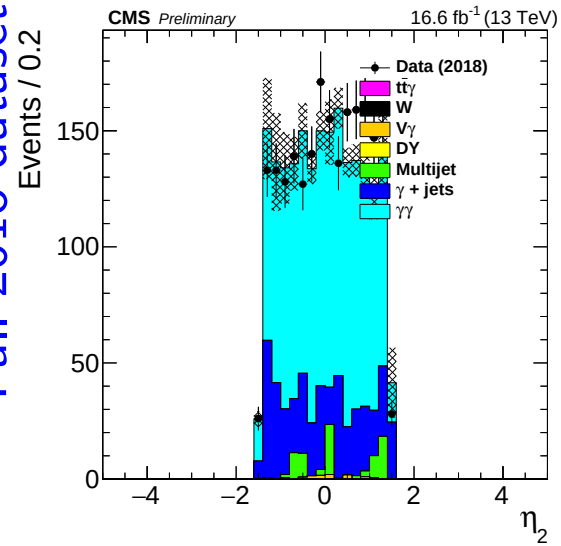
Data/MC Comparisons: η_2

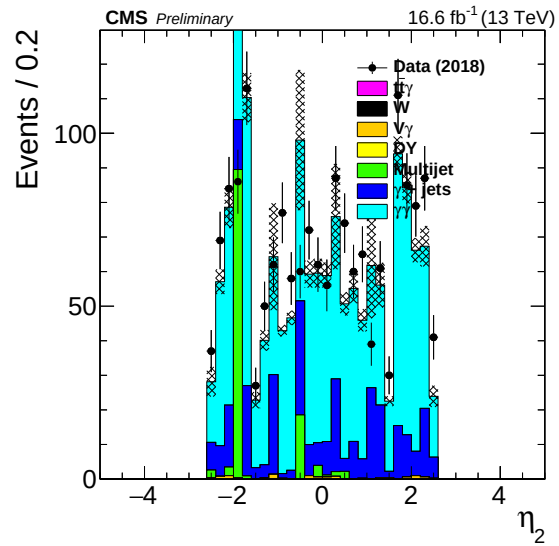
- *Fake rate higher in EE- even in MC?

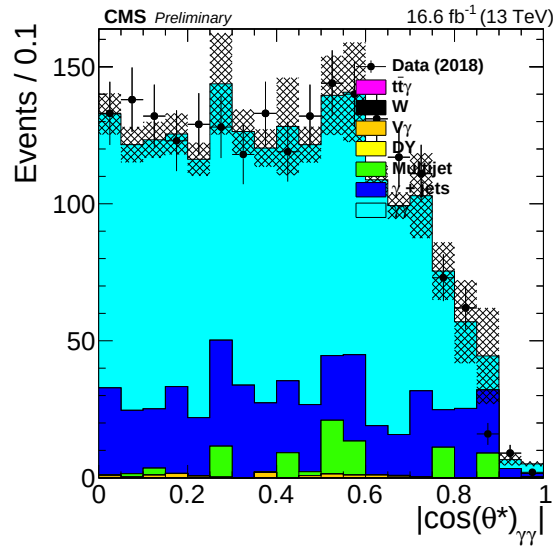
*Notes from Chris' slides

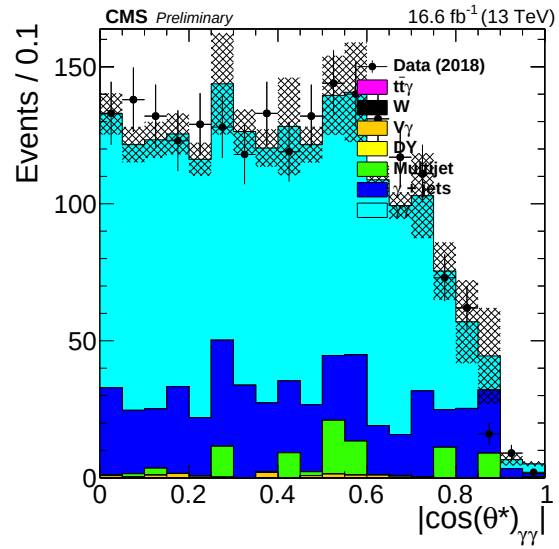
Full 2018 dataset

New 2018 data







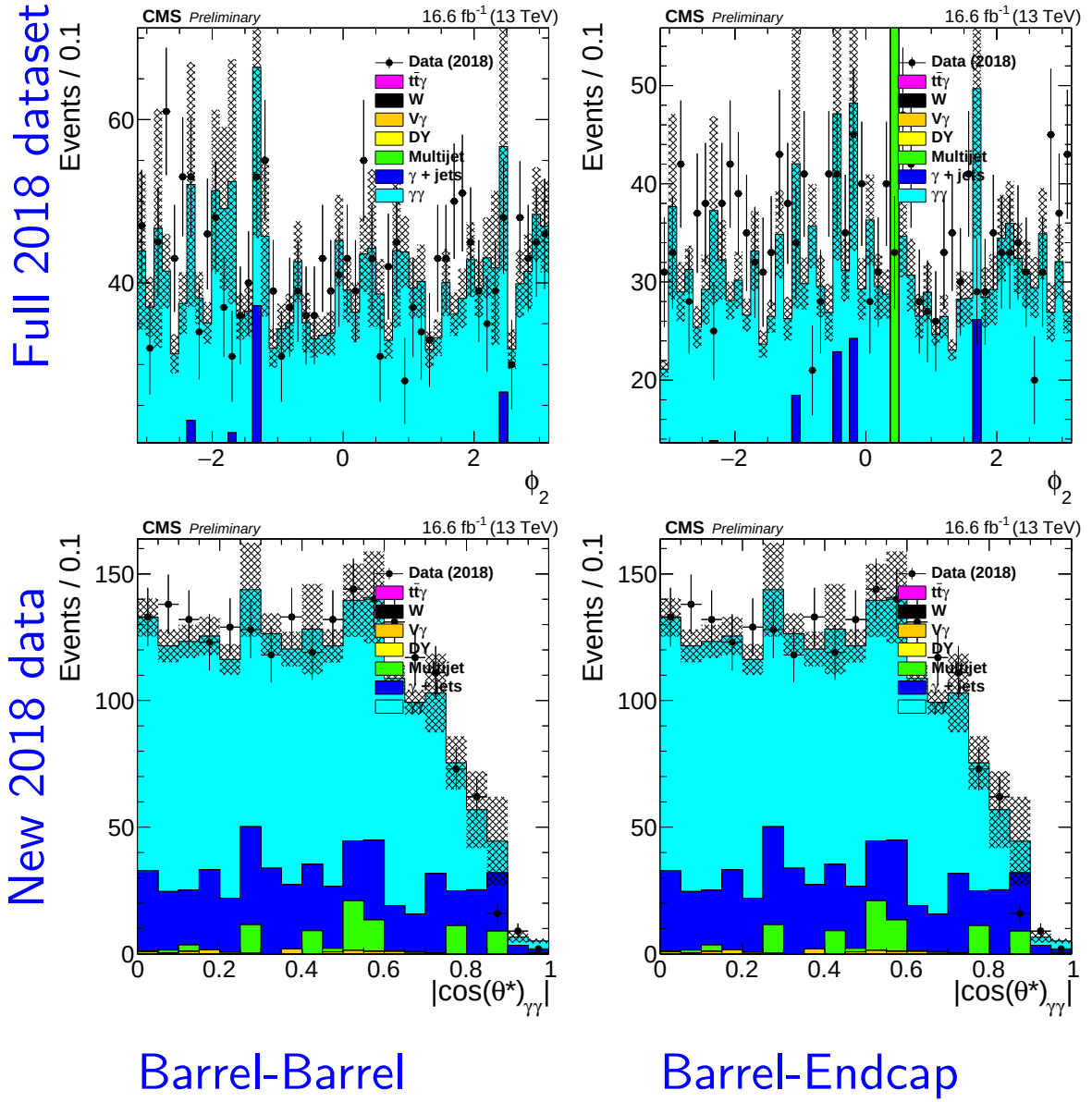


Barrel-Barrel

Barrel-Endcap

Data/MC Comparisons: ϕ_2

- Flat



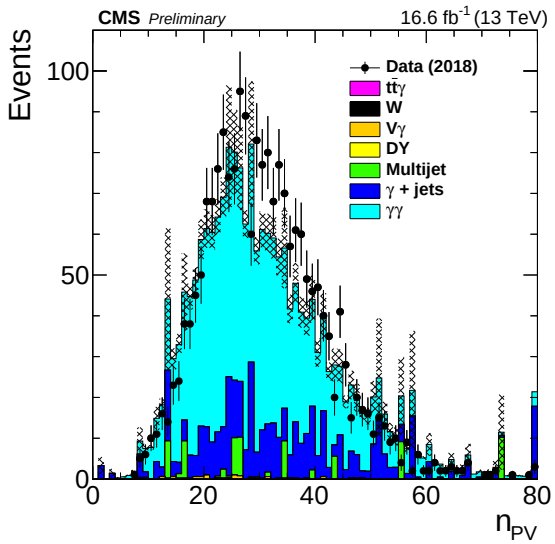
Data/MC Comparisons: n_{PV}

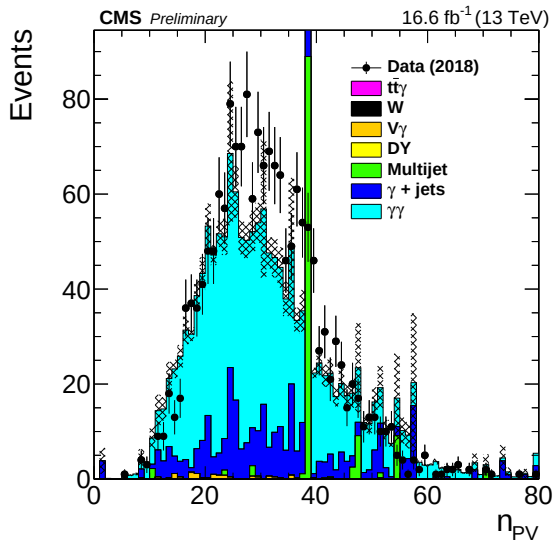
- *Similar nPV distribution to previous luminosity increment
  - *Expected because LHC has tried to increase bunch intensity

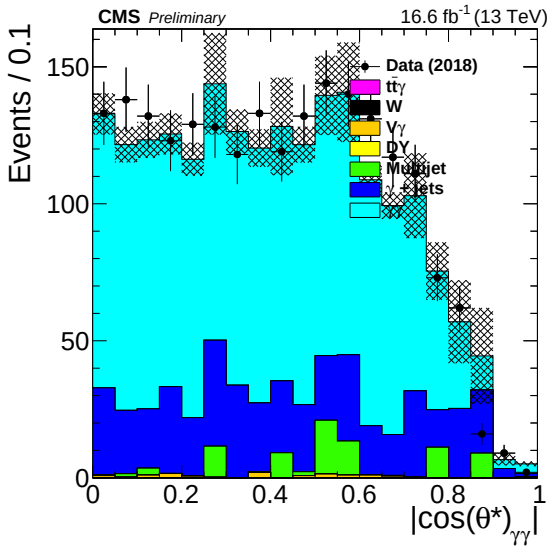
*Notes from Chris' slides

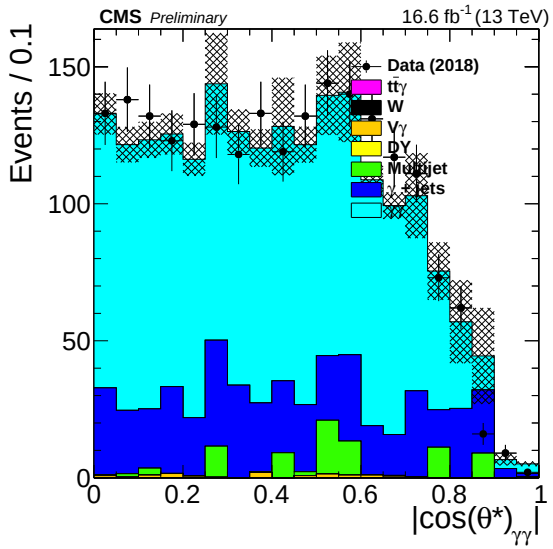
Full 2018 dataset

New 2018 data









Barrel-Barrel

Barrel-Endcap