# Update Extra Dimensions Search in the Diphotons Final State Using 2.2fb$^{-1}$

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# Data and MC Samples

- Collision data (Total: 2.2/fb):
  - /Photon/Run2011A-May10ReReco-v1/AOD 217/pb
  - /Photon/Run2011A-PromptReco-v4/AOD 930/pb
  - /Photon/Run2011A-05Aug2011-v1/AOD 371/pb
  - /Photon/Run2011A-PromptReco-v6/AOD 662/pb
- MC diphoton samples:
  - /DiPhotonBorn_Pt-25To250_7TeV-pythia6/Summer11-PU_S4_START42_V11-v1/GEN-SIM-RECO
  - /DiPhotonBorn_Pt-250_7TeV-pythia6/Summer11-PU_S4_START42_V11-v1/GEN-SIM-RECO
  - /DiPhotonBox_Pt-25To250_7TeV-pythia6/Summer11-PU_S4_START42_V11-v1/GEN-SIM-RECO
  - /DiPhotonBox_Pt-250_7TeV-pythia6/Summer11-PU_S4_START42_V11-v1/GEN-SIM-RECO

# Selections

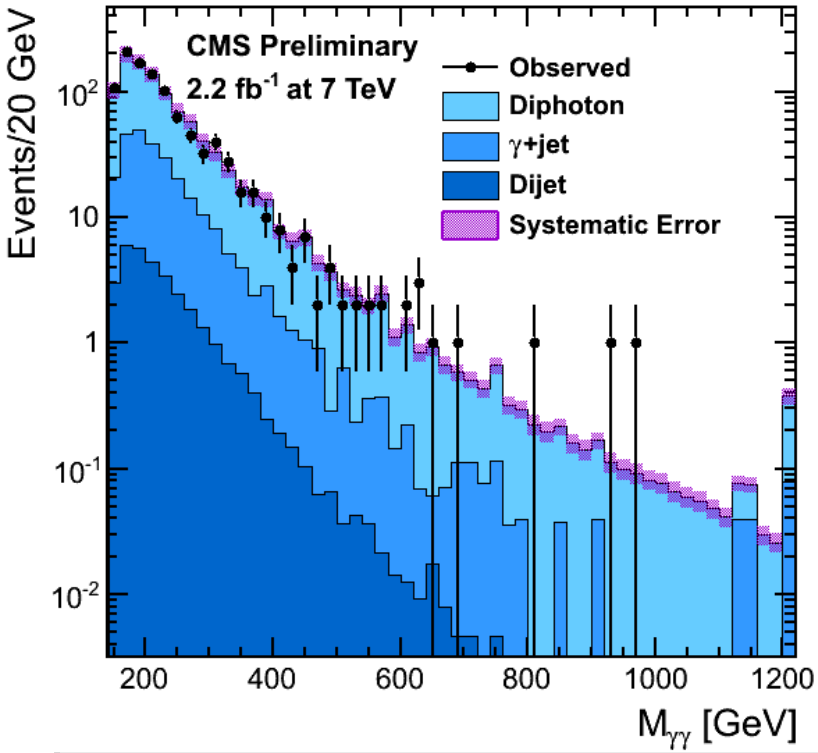
- Use EB-EB diphotons only

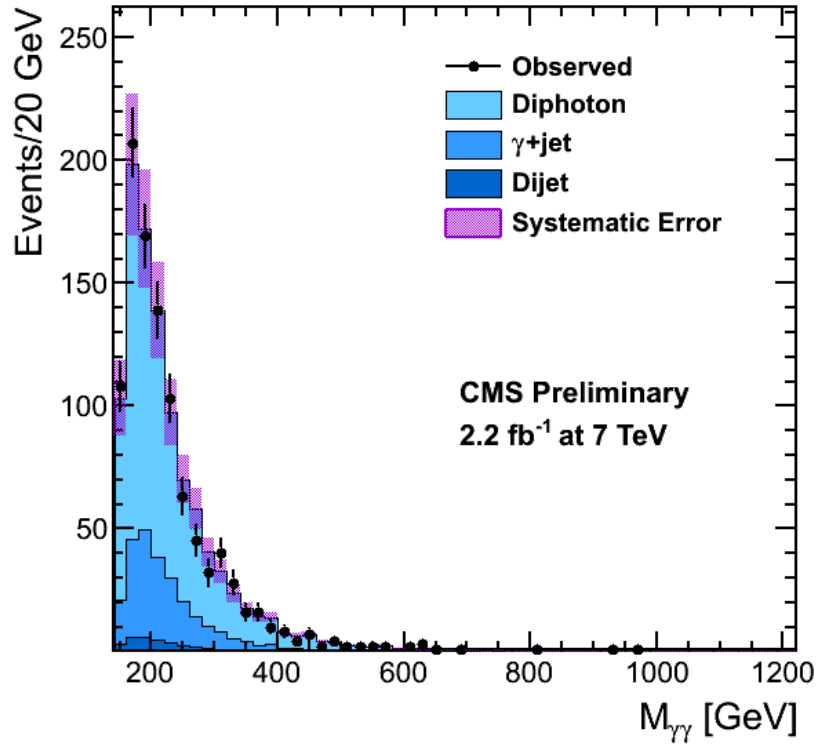
| Criteria | Requirement |
|---|---|
| HLT | `HLT_DoublePhoton33_v*` OR `HLT_DoublePhoton50_v*` OR `HLT_DoublePhoton60_v*` |
| $p_T$ | $> 70$ GeV$/c$ |
| $M_{\gamma\gamma}$ | $> 140$ GeV$/c^2$ |
| $\eta$ | $\lvert\eta_{det}\rvert < 1.4442$ |
| $H/E$ | $< 0.05$ |
| ECAL Isolation | $(0.06 < \Delta R < 0.4) < 4.2$ GeV $+ 0.006 \cdot p_T$ |
| HCAL Isolation | $(0.15 < \Delta R < 0.4) < 2.2$ GeV $+ 0.0025 \cdot p_T$ |
| Track Isolation | $(0.04 < \Delta R < 0.4) < 2.0$ GeV $+ 0.001 \cdot p_T$ |
| $\sigma_{i\eta i\eta}$ | $< 0.013$ |
| Track Veto | No Pixel Seed |

Table 4: Summary of photon identification, kinematic, and fiducial requirements.

DRAFT

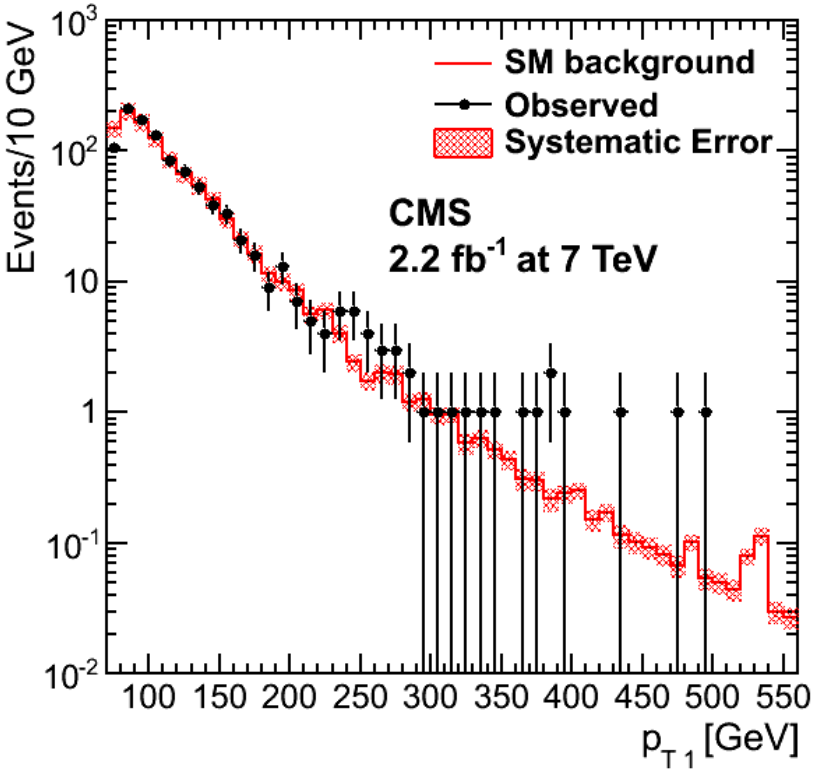
# Invariant Mass

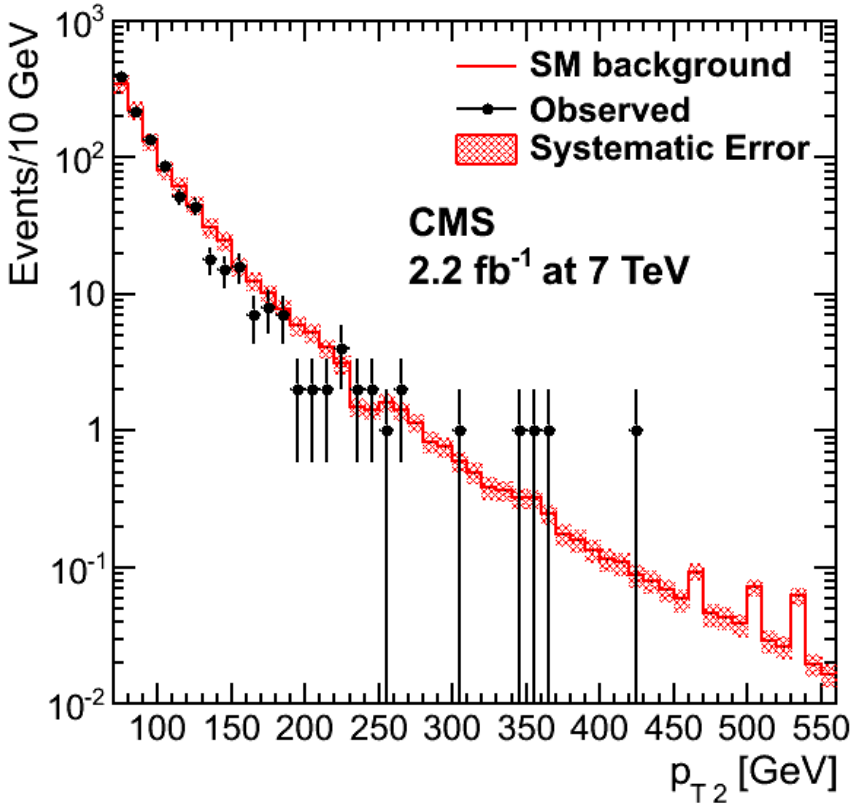


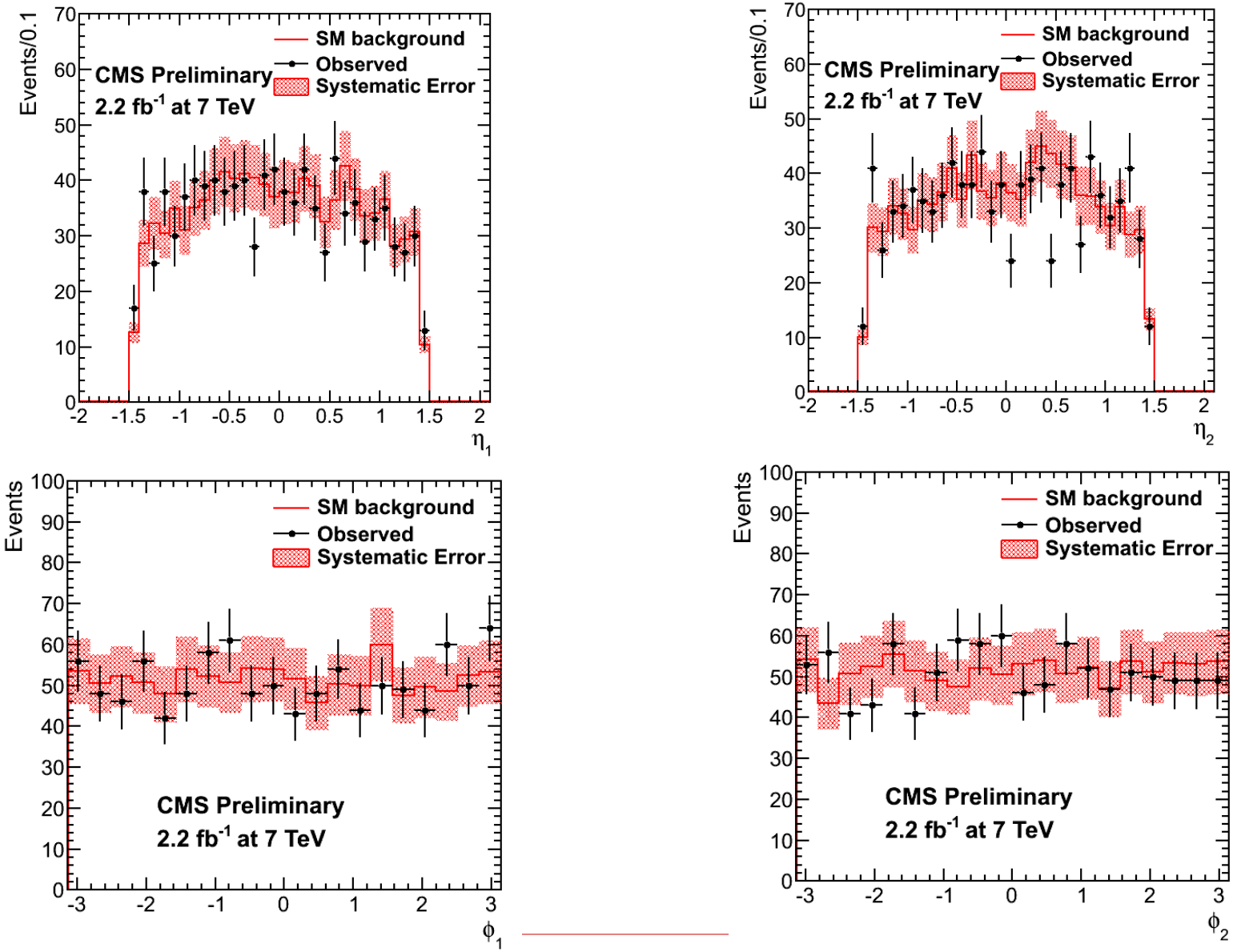
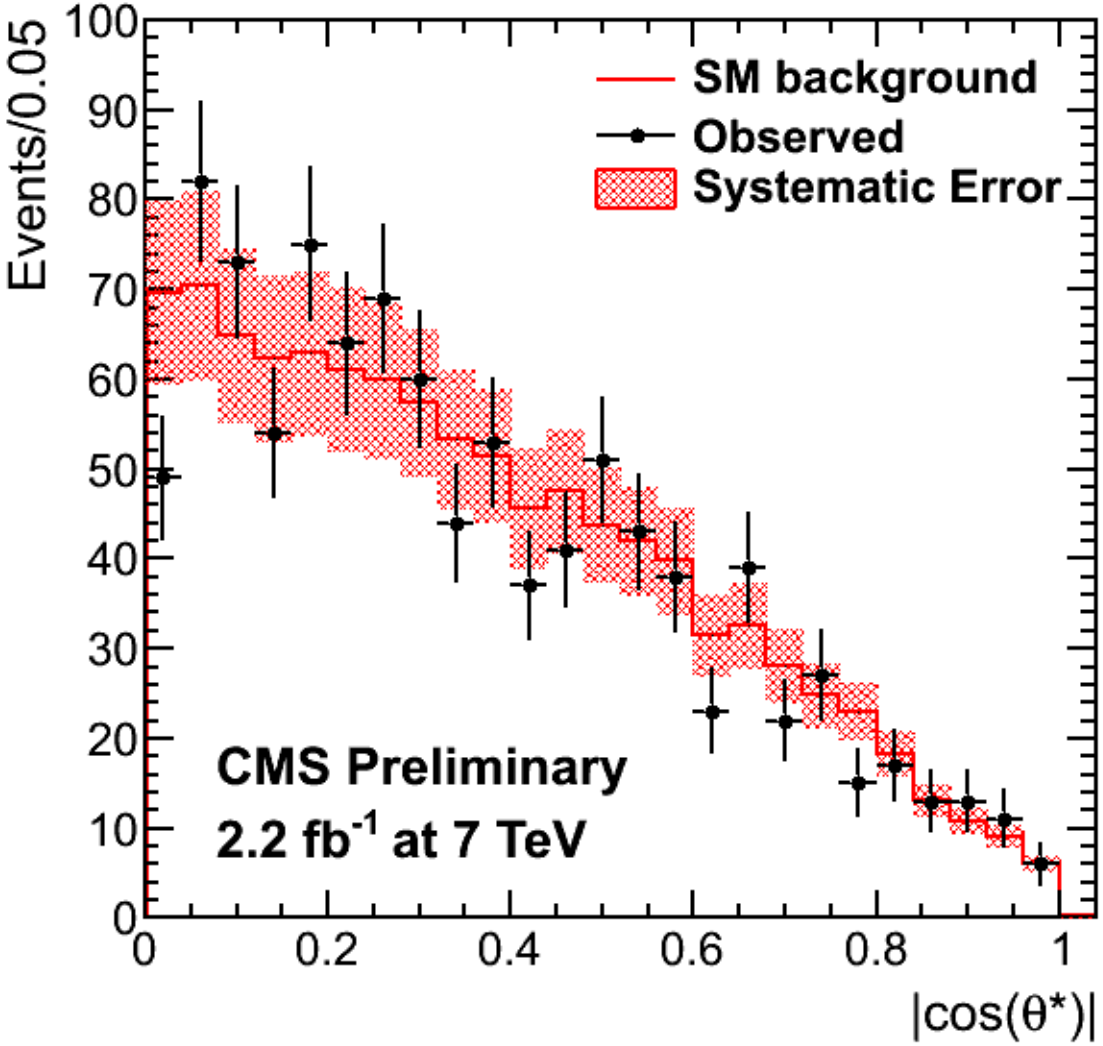

| | 140-200 GeV | 200-500 GeV | 500-800 GeV | 800-inf GeV |
|---|---|---|---|---|
| Dijet | 15 ± 6 | 17 ± 7 | 0.2 ± 0.1 | 0.008 ± 0.003 |
| Gamma+Jet | 102 ± 15 | 124 ± 18 | 2.5 ± 0.4 | 0.22 ± 0.04 |
| Diphoton | 357 ± 65 | 395 ± 72 | 14.5 ± 2.7 | 2.2 ± 0.4 |
| Total Background | 474 ± 69 | 536 ± 76 | 17.2 ± 2.7 | 2.4 ± 0.4 |
| Observed | 484 | 517 | 15 | 3 |

# pT Plots


SM background
Observed
Systematic Error
CMS
2.2 fb-1 at 7 TeV
Events/10 GeV
pT 1 [GeV]


SM background
Observed
Systematic Error
CMS
2.2 fb-1 at 7 TeV
Events/10 GeV
pT 2 [GeV]

# Eta and Phi Plots



# Cos(ThetaStar)