

**WW update**

# New MC samples

- Inclusive WW with ad hoc pileup mixing:
  - 100k events generated with Pythia+FastSim without pileup, scaled to predicted NLO cross-section
    - (Another 100k still running)
  - Combine each event with the pileup protons from an FPMC event produced by Luiz+Maria Elena (excluding the protons from the exclusive signal interaction)
    - Caveat - PU is reused several times on average
- Anomalous couplings
  - Produced by Maria Elena for 2 points, 1000 events each:
    - $a_{0W}/\Lambda^2 = 10^{-6}$ ,  $a_{CW}/\Lambda^2 = 0$
    - $a_{0W}/\Lambda^2 = 0$ ,  $a_{CW}/\Lambda^2 = 10^{-6}$

# Inclusive WW backgrounds

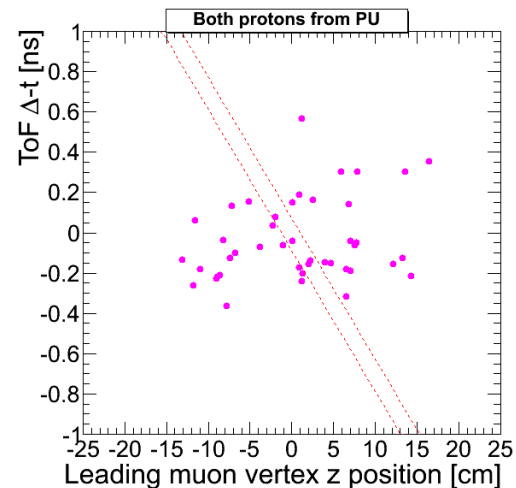
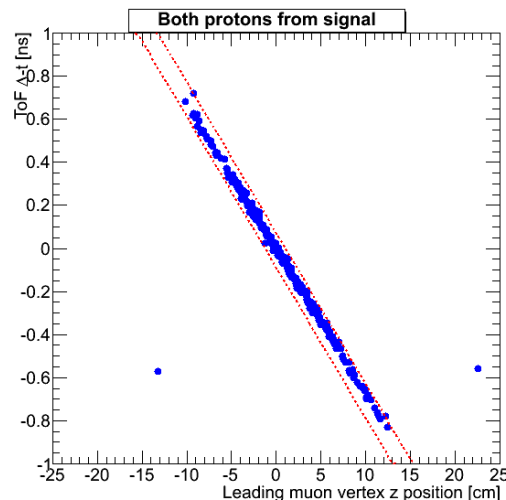
Table 5: Yields for signal and background events after the full event selection. Yields correspond to an integrated luminosity of  $100 \text{ fb}^{-1}$ . Only the  $\mu\mu$  final state is considered. Statistical uncertainties are shown.

process	events
exclusive WW events (signal)	$3.3 \pm \text{xx}$
inclusive WW + pileup	$230 \pm \text{xx}$
exclusive $\tau\tau$ events	$0.3 \pm \text{xx}$

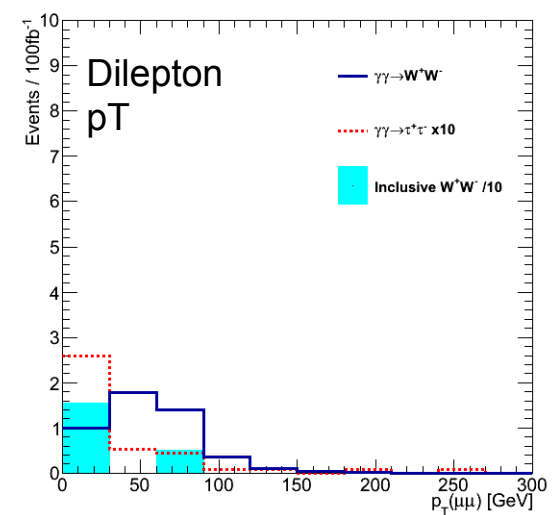
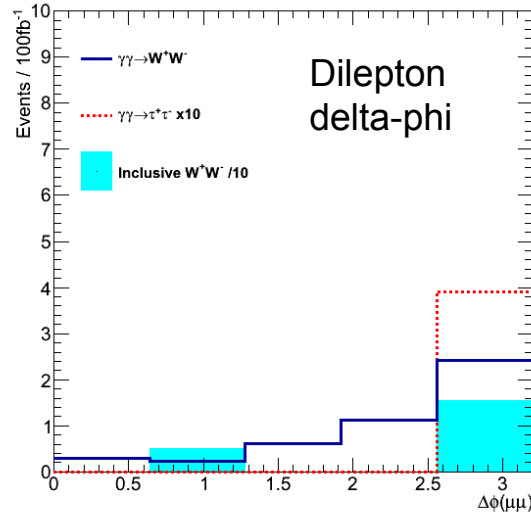
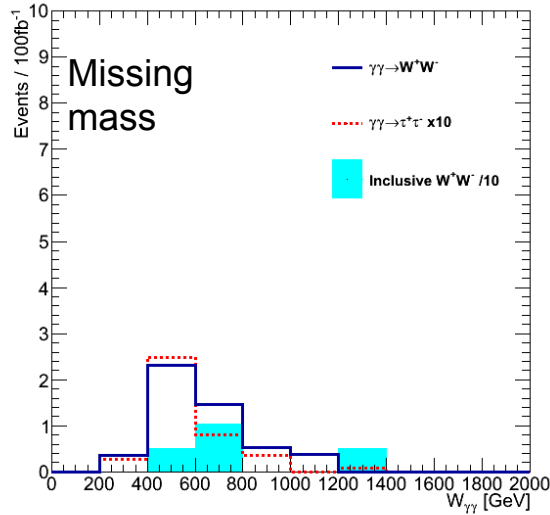
- Central detector lepton cuts and PPS acceptance cuts only
  - (Before timing or track multiplicity cuts)

# Adding timing cuts

- 10ps resolution (5x4 Quartic) assumed
- Keep events within the red bands
  - ~99% of signal events
  - ~10% of inclusive WW background events

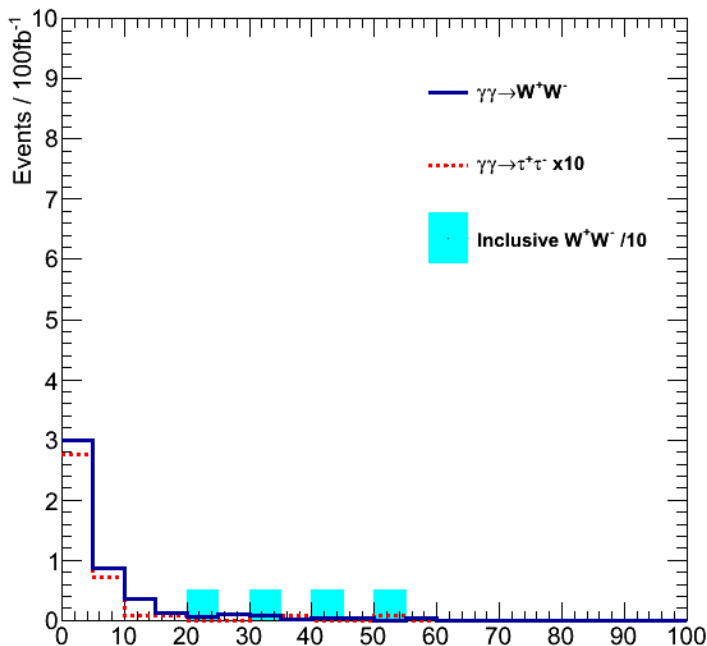


# Signal/background plots



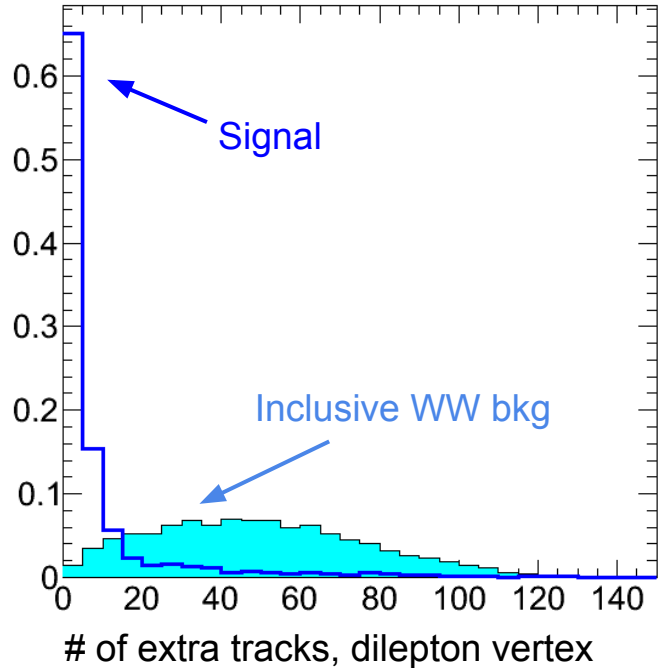
- Plots after timing cuts:
  - Signal is scaled to 100fb<sup>-1</sup>
  - For comparison of shapes: tau+tau- is scaled up a factor x10, inclusive WW is scaled down a factor /10

# Adding track multiplicity cuts



- Multiplicity of “extra” tracks associated to the dilepton vertex in CMS tracker
  - Same timing cuts as previous plots
  - Same normalization as previous plots
  - Default CMS DA vertex clustering and tracking cuts
- (Within limited statistics) a loose cut helps suppress the surviving inclusive  $WW$  background events

# Track multiplicity cuts



- Try to quantify this better by removing all PPS requirements to enhance statistics
  - # of tracks associated to the dilepton vertex, normalized to unity
- Requiring  $<10$  tracks (the first 2 bins) keeps 80% of signal, 5% of backgrounds

# Next plans for the SM “analysis”

1. Add the pdf plots and numbers after the timing/track multiplicity cuts on the twiki (today)
2. Redo for 30ps (tomorrow)
3. Update plots with 100k more inclusive WW events (tomorrow-Friday?)
4. Fine-tune combination of timing+multiplicity cuts (Friday)
5. Try to add muon-electron and  $e^+e^-$  channels (next week)
6. Check background yields against ATLAS study applying the same cuts (next week)
7. Other ??



# AQGC - first look at distributions for $100\text{fb}^{-1}$

- Apply the same cuts to the SM and two AQGC samples
  - Central detector lepton cuts, PPS acceptance, + 10ps timing cuts from the previous slides
    - Only exclusive WW (SM and SM+AQGC) shown
  - From cross sections after GEN-level PPS cuts, expect  $\sim 10\%$  enhancement in the  $a_0W$  case
  - Within statistics, not much difference visible with  $100\text{fb}^{-1}$
  - Sample with a slightly larger value ( $\sim 5 \cdot 10^{-6}$  as ATLAS?) would be useful to interpolate

