Higgs Searches: Weekly report

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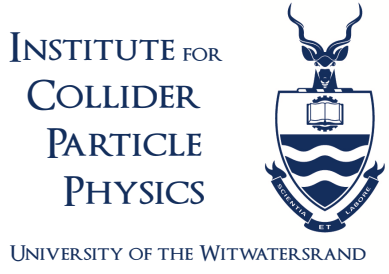


Update on $pp \to HH \to 4\ell$ analysis

CutFlow

	Non-Res	$qq \to ZZ$	$t\bar{t}Z$	$t\bar{t}$	VVV
At least 4ℓ	4005.00±63.29	633669.00±796.03	71240.00±266.91	5091.00±71.35	32339.00±179.83

Table: Unweighted number of events.

	Non-Res	$qq \to ZZ$	$t\bar{t}Z$	$t\bar{t}$	VVV
At least 4ℓ	154.00±5.41	1272.87±4.05	74.56±0.62	400.04±5.74	10.49±0.10

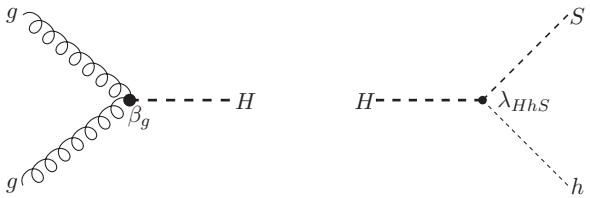
Table: Weighted number of events with including a factor of 1000.

	Non-Res	$qq \to ZZ$	$t\bar{t}Z$	$t\bar{t}$	VVV
At least 4ℓ	0.15±0.01	1272.87±4.05	74.56±0.62	400.04±5.74	10.49±0.10

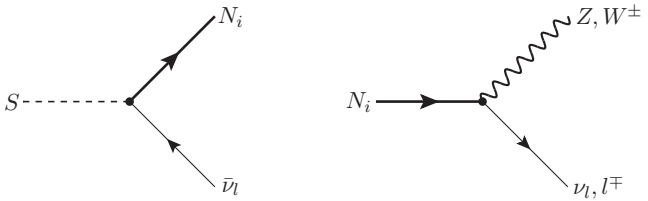
```
if(mc_channel_number==450663) scale_nom = 0.0001336*scale_nom/mc_rawXSection;// Correcting the signal cross-section.
if(RunYear<2016.5) lumi = 36207.66;                                          // old lumi=36074.6. For data 2015 and 2016.
if(RunYear>2016.5&& RunYear<2018) lumi = 44307.4;                            // old lumi=43813.7. For data 2017.
if(RunYear>2017.5) lumi = 58450.1;                                           // old lumi= ? data 2018.

 //double MCweight = (36074.6*(RunYear==2015||RunYear==2016)+43813.7*(RunYear==2017))*pileupEventWeight_090*JVT_EventWeight*mcWeightOrg*scale_nom; // This one is recommended but so hard to understand.
 //double MCweight = lumi*pileupEventWeight_090*JVT_EventWeight*mcWeightOrg*scale_nom*xsec/mc_rawXSection; //This is not right as it will not consider including the xsec for the background.
 double MCweight = lumi*pileupEventWeight_090*JVT_EventWeight*mcWeightOrg*scale_nom;
```

Phenomenology of the Dilepton final states

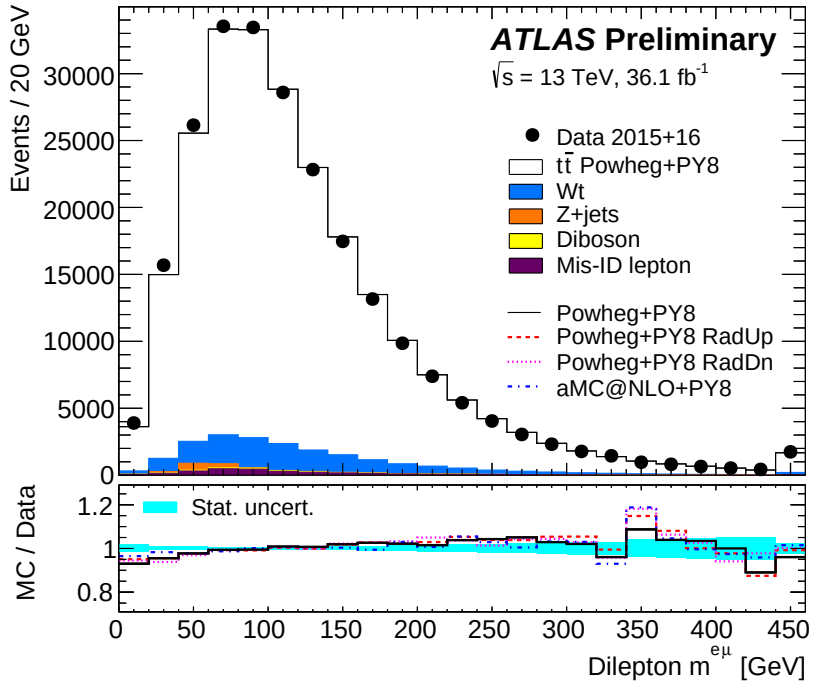
Introduction



- $H \to Sh, H \to SS \to$ All

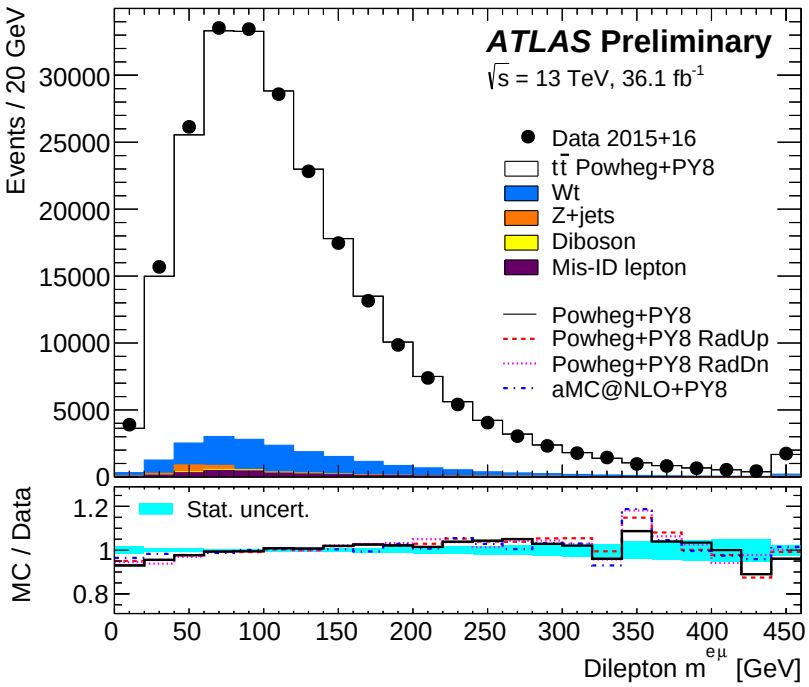


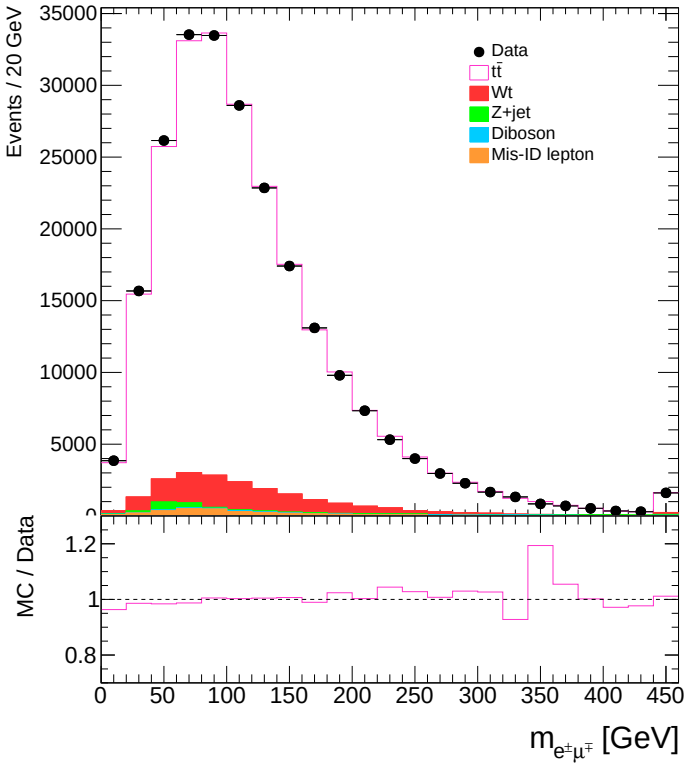
- $S \to N_i \overline{\nu_l} \to Z\nu_l / W^{\pm}\ell^{\mp}$



Phenomenology of the Dilepton final states

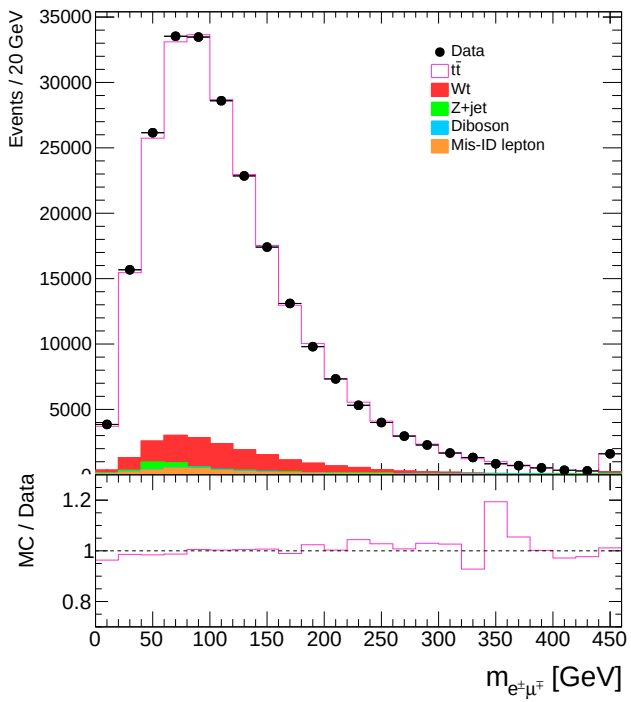
ATLAS dilepton invariant mass



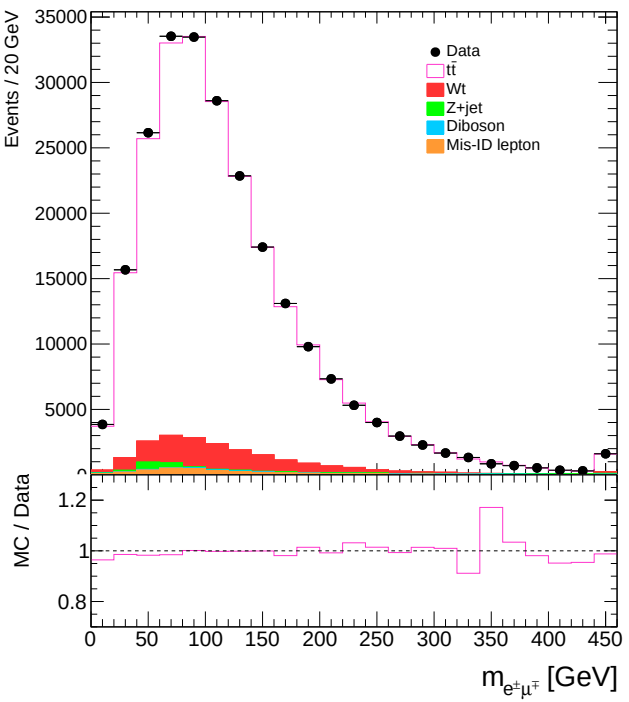


Phenomenology of the Dilepton final states

Applying the EW correction



(a) No EW correction



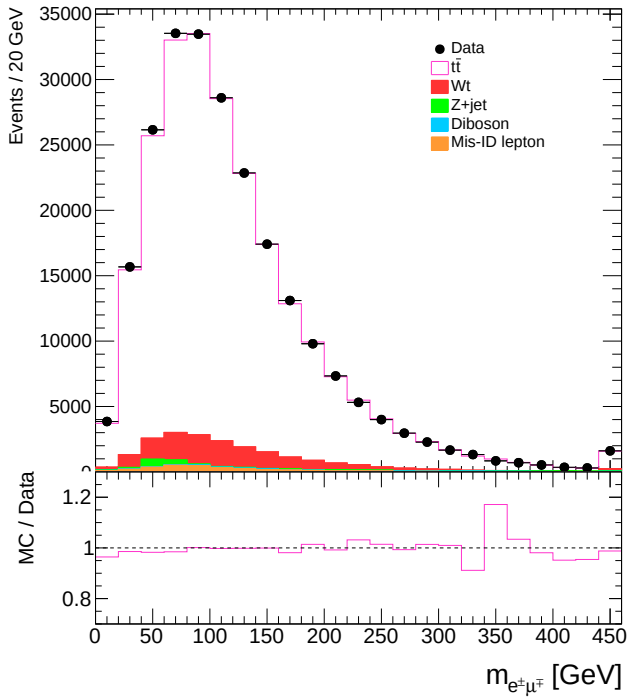
(b) With EW correction

Remark:

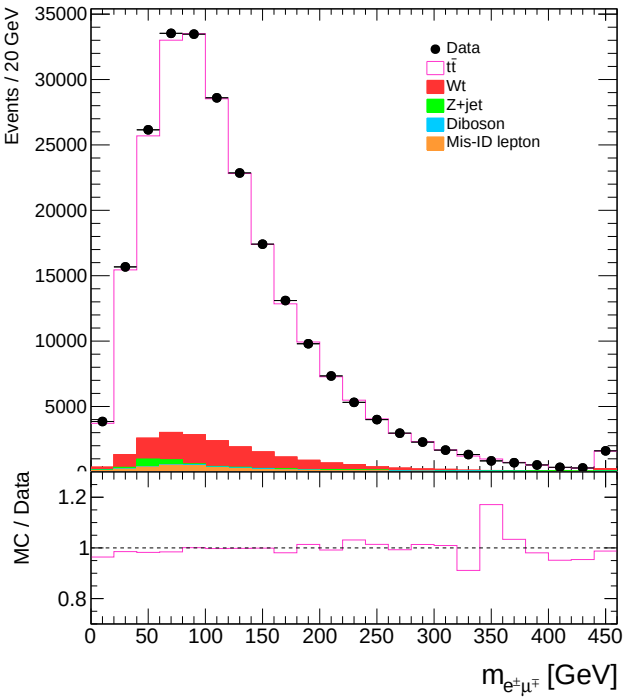
$p_0 + p_1 \times m_{\ell\ell}$; $p_0 = 1.00164$, & $p_1 = -0.000064843$. See slide 2 here

Phenomenology of the Dilepton final states

Normalisation of the total background



(c) EW correction only



(d) EW correction and scaling

Remark:

$$\text{Scale factor}(m_{\ell\ell} > 110) = \frac{N^{\text{Data}}}{N^{\text{Background}}} = 0.999$$

Thank you!