

Search for Heavy gauge boson

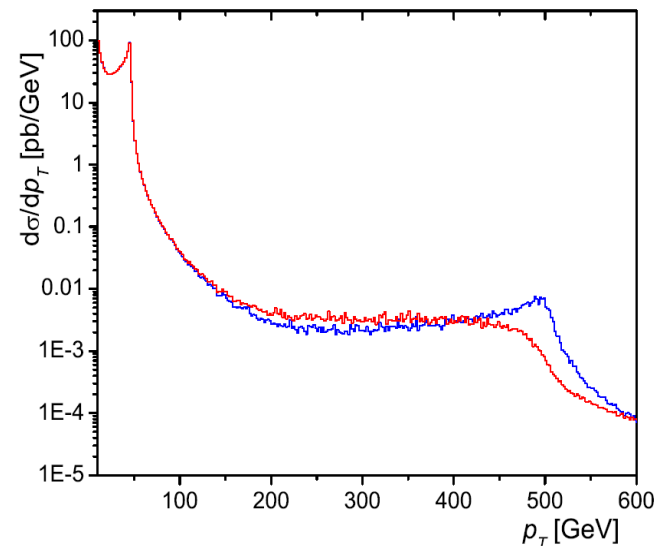
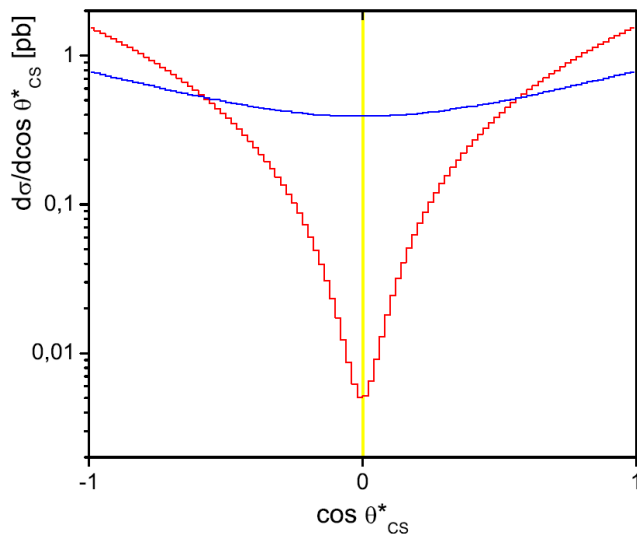
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Heavy bosons

- Many models from GUT (Grand Unified Theories) to ED (Extra Dimensions) predict an existence of a heavy gauge bosons W' and Z'
- Benchmark model is SSM (Sequential Standard Model)
- Another model – chiral boson (Z^* , W^*), M.V. Chizhov, V.A. Bednyakov and J.A. Budagov, arXiv:0801.4235 [hep-ph].



Event selection

- W^*/W' electron + MET channel:
Observable

$$m_T = \sqrt{2p_T E_T^{miss} (1 - \cos \varphi)}$$

Backgrounds:

- $W \rightarrow l\nu$
- QCD (dijets)
- $t\bar{t}$
- $DY \rightarrow ll$
- Dibosons (WW, WZ, ZZ)

Selection:

Just one triggered isolated medium electron with $E_T > 25$ GeV plus $MET > 25$ GeV

- Z^*/Z' dielectron channel:
Observable

$$m_{ee} = \sqrt{2p_1 p_2 (1 - \cos \varphi)}$$

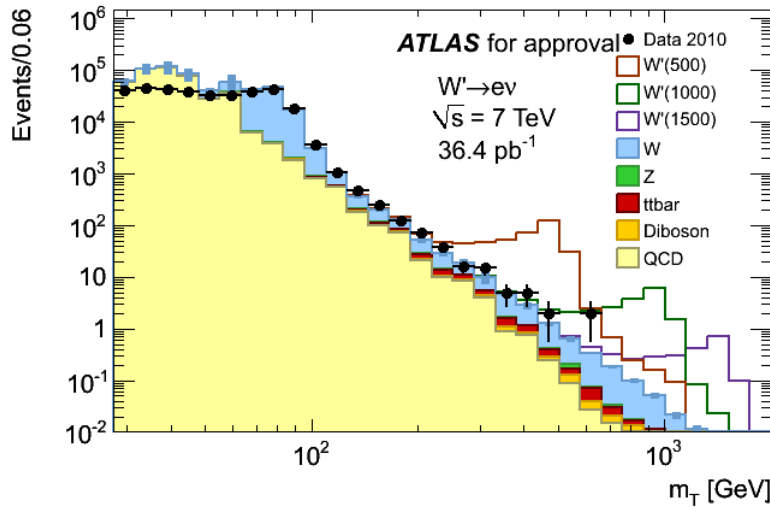
Backgrounds:

- $DY \rightarrow ll$
- Dibosons (WW, WZ, ZZ)
- $W + \text{jet}$
- $T\bar{t}$

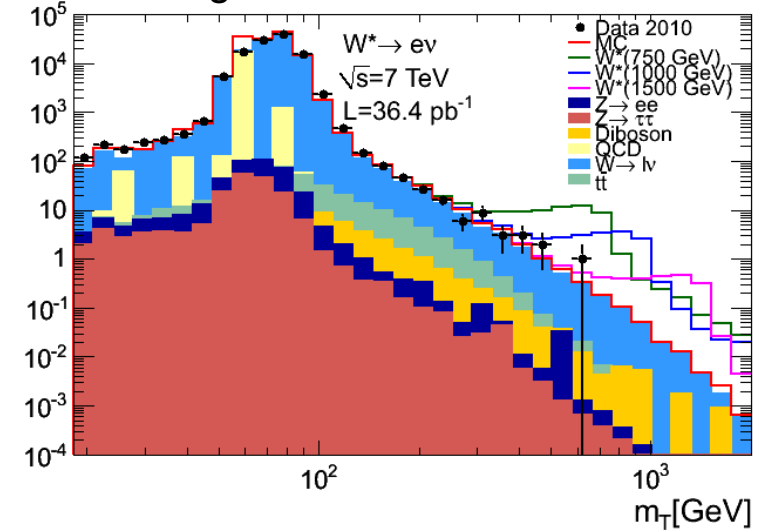
Selection:

Exact two isolated medium electron with $E_T > 25$ GeV (one of them - triggered)

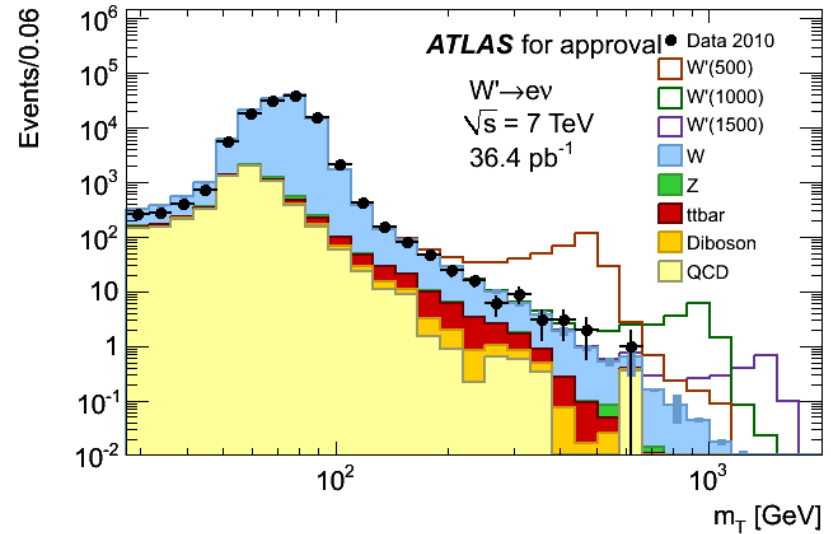
mT spectrum after preselection. Signal – W'



mT spectrum after final selection. Signal – W^* .
 QCD background – MC



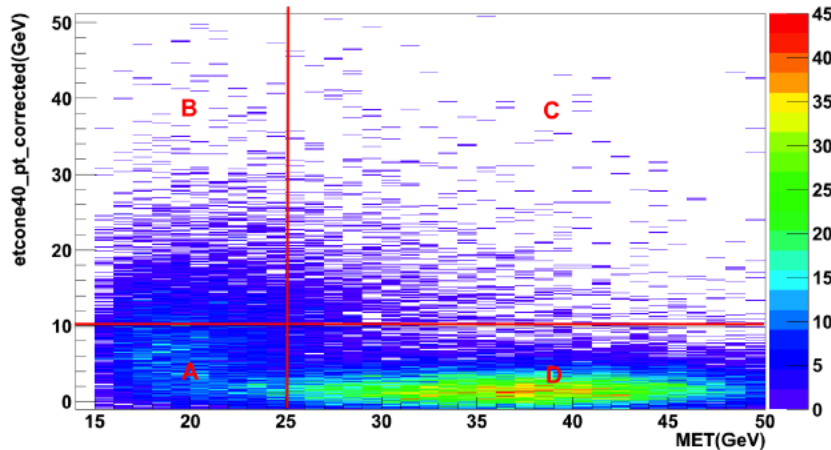
mT spectrum after final selection. Signal – W' .
 QCD background – data driven estimation



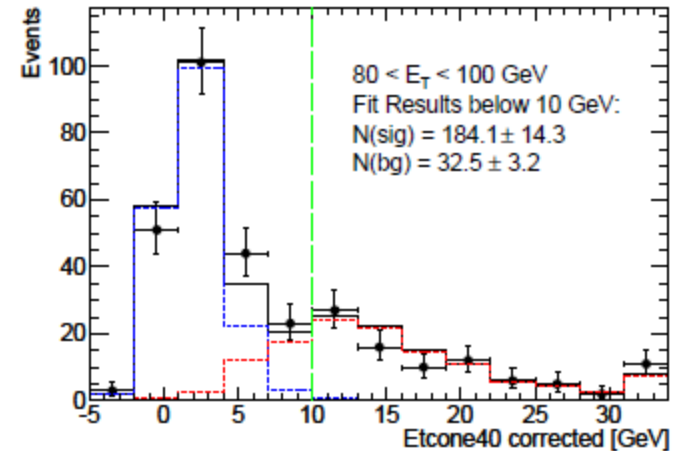
1 event is observed for $m_T > 500 \text{ GeV}$ with 1.33 ± 0.01 expected

Data Driven Background estimation

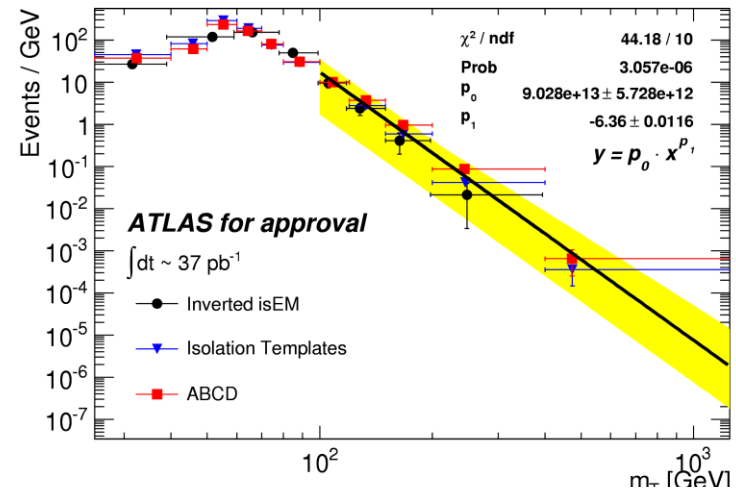
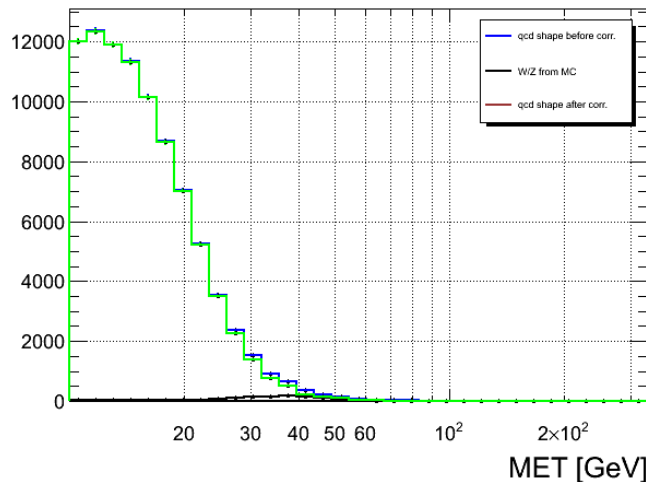
Calorimetric isolation vs MET after all selections



Calorimeter isolation template after MET cut

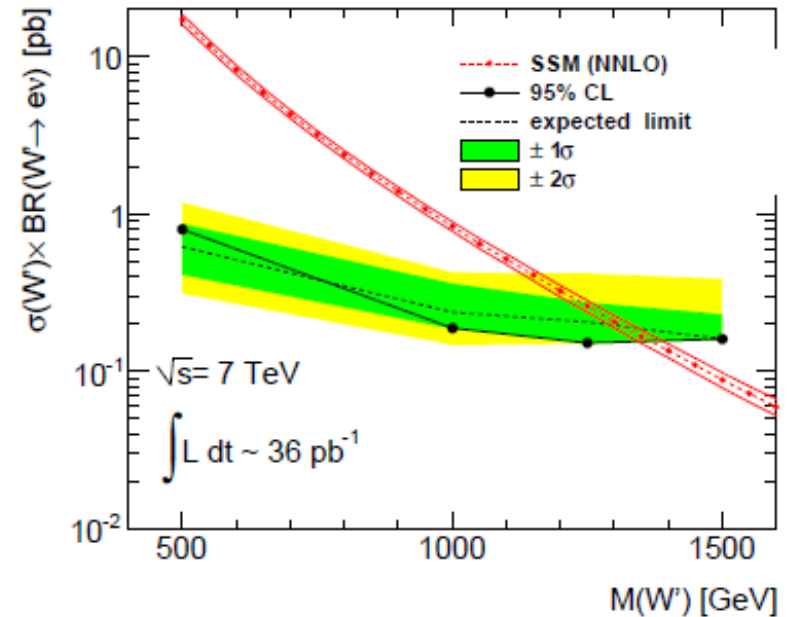
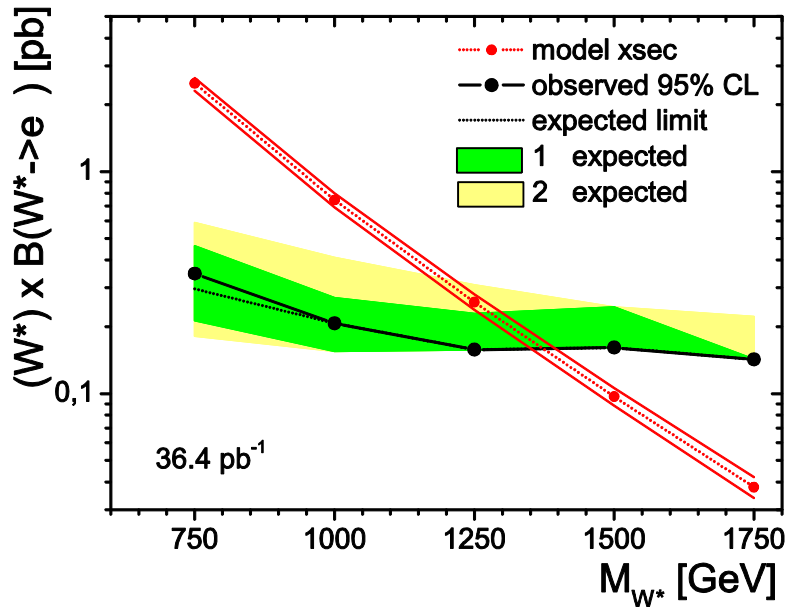


MET for events failed Medium IsEM cut



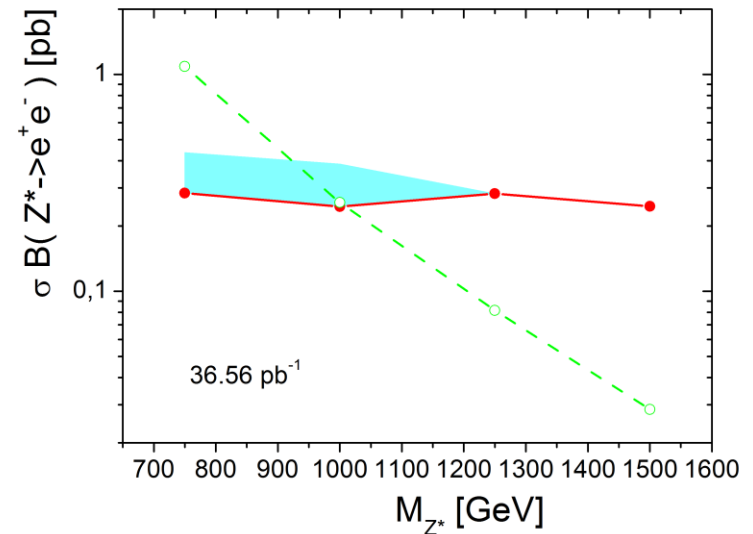
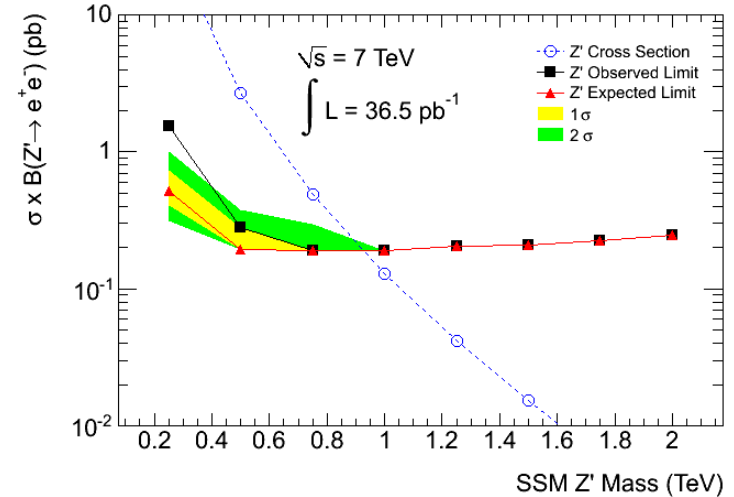
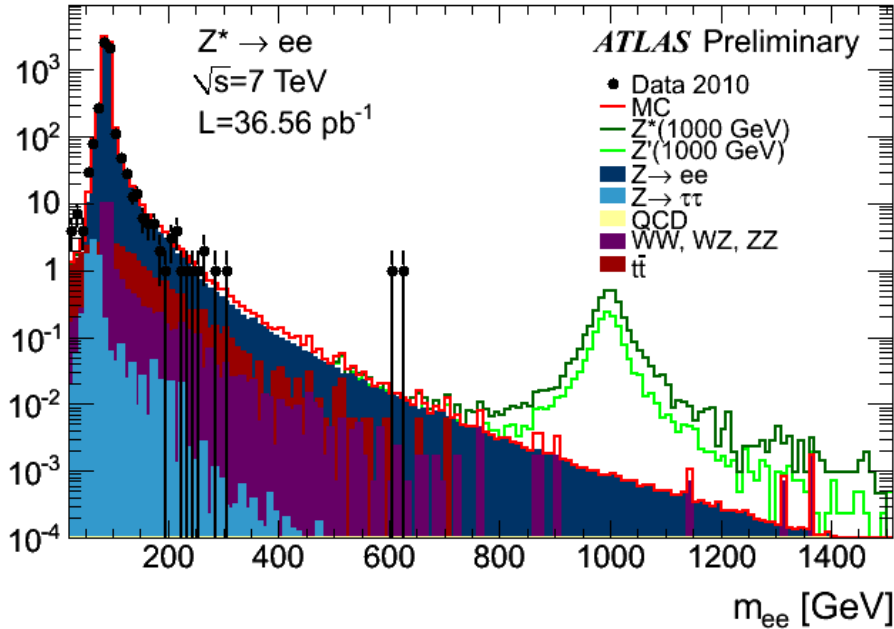
QCD Estimate	$100 < m_T < 400$	$m_T > 250$	$m_T > 500$	$m_T > 625$	$m_T > 750$
Central Estimate	$77.2682^{+41.1390}_{-46.3711}$	$0.2770^{+0.5379}_{-0.2093}$	$0.0039^{+0.0270}_{-0.0034}$	$0.0010^{+0.0097}_{-0.0009}$	$0.0003^{+0.0042}_{-0.0003}$

electron + MET: Exclusion Limit



W'/W^* are excluded up to 1350 GeV at 95% CL with an integrated luminosity of 36.4 pb^{-1}

Dielectron resonance



- Current Tevatron limit is $M_{W'} > 1024 \text{ GeV}$
- ATLAS preliminary with 36.5 pb^{-1} :
 - $M_{W'} > 900 \text{ GeV}$
 - $M_{W'^*} > 1000 \text{ GeV}$