Imperial College London

Lepton Efficiency Uncertainties

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Introductinon

- Combinations group asked us to determine whether the lepton ID/veto efficiency uncertainty had an effect on our analysis
- Efficiency is not applied in analysis A code
- In analysis B it is applied on an event by event per lepton basis the same as in $ZH \rightarrow ll + inv$

Method

Tight leptons (Control Regions)

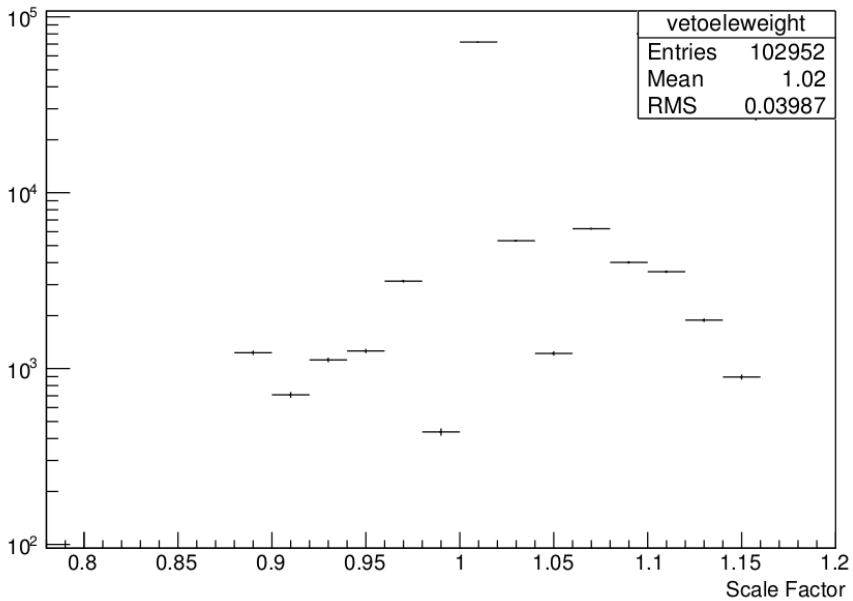
- For every tight lepton selected weight event by: $\epsilon_{data}/\epsilon_{MC}$

Veto leptons (Signal Region)

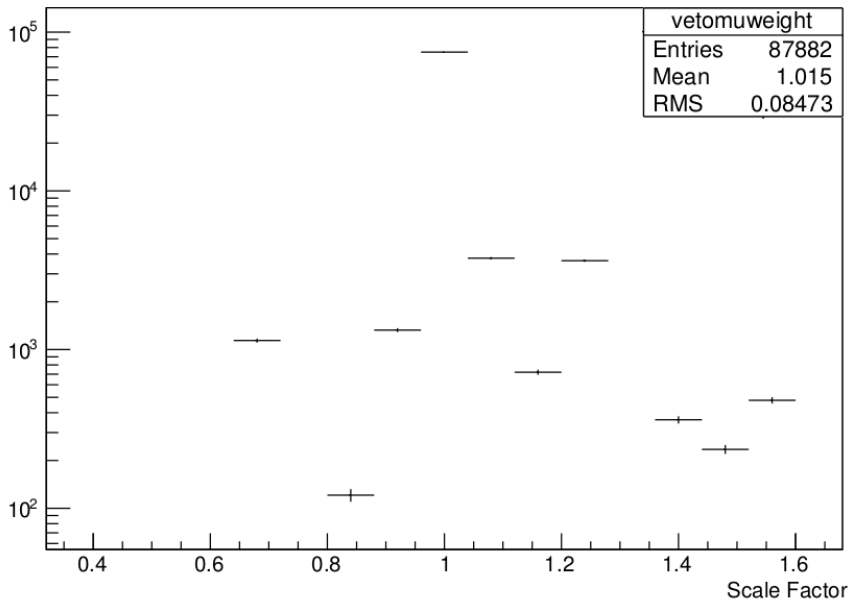
- In selected events there are, by definition, no reconstructed veto leptons
- Get generator level leptons in event
- Apply a weight of $\frac{1-\epsilon_{data}}{1-\epsilon_{MC}}$ for each gen lepton in the p_T and η acceptance

Veto Event Weight

Electron ($W \to e\nu$ MC no EWK)



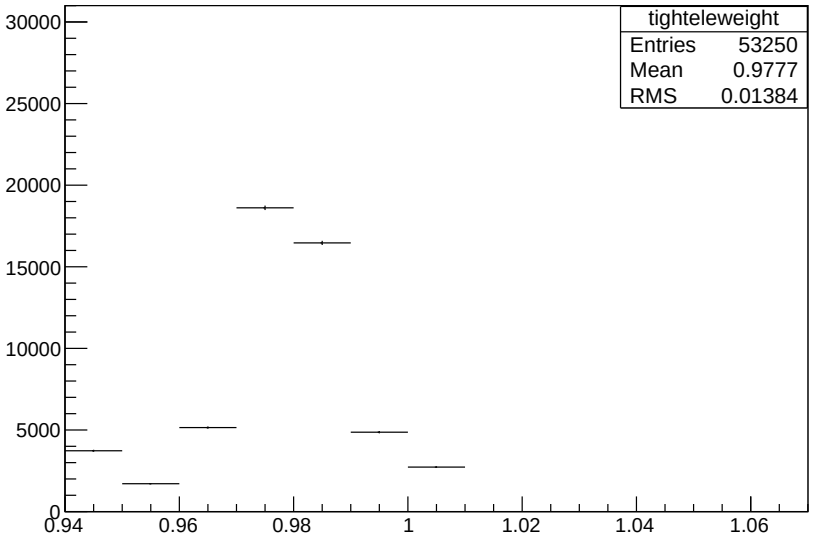
Muon ($W \to \mu\nu$ MC no EWK)



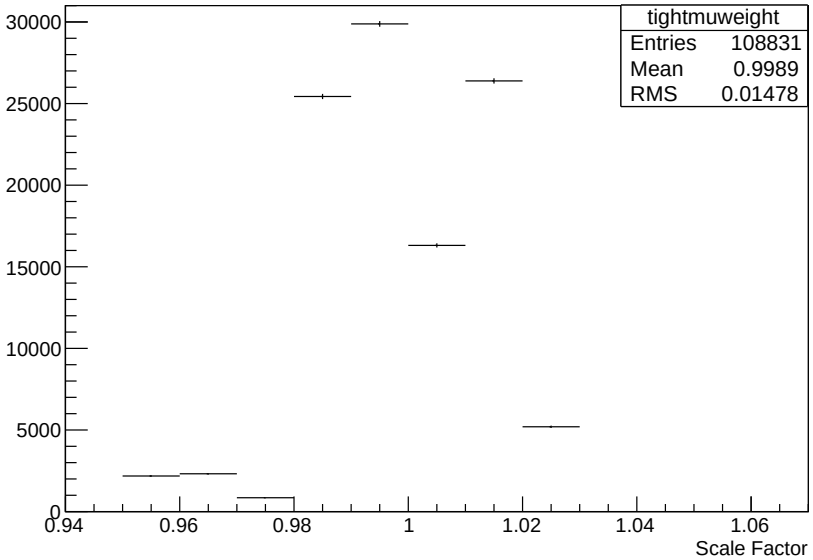
Plots after lepton veto step

Tight Event Weight

Electron ($W \to e\nu$ MC no EWK)



Muon ($W \to \mu\nu$ MC no EWK)



Plots after lepton selection step

Yields

Channel	No correction	Central	Lep. eff. up	Lep. eff. down
$W \to e\nu$	68.8 (-4%)	71.8	71.5 (-0.4%)	72.1 (+0.4%)
$W \to \mu\nu$	67.4 (-1%)	68.1	66.3 (-2.6%)	69.1 (+1.5%)