

$H \rightarrow ZZ \rightarrow llqq$ Update

Carl Gwilliam, Andy Mehta



UNIVERSITY OF
LIVERPOOL



27th November 2013
 $H \rightarrow ZZ \rightarrow llqq$ Meeting

Outline



- 1 News
- 2 Introduction
- 3 Control Plots
- 4 Background
- 5 Merged
- 6 VBF Interference



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- Kick-off meeting with the Ed board on 4th Dec @ 6pm
 - Plan to have short talk from each channel + presentation of timeline
 - Do we want meeting next week directly before?
- Missing signal points for ggF NWA are now done in D3PD too



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Introduction



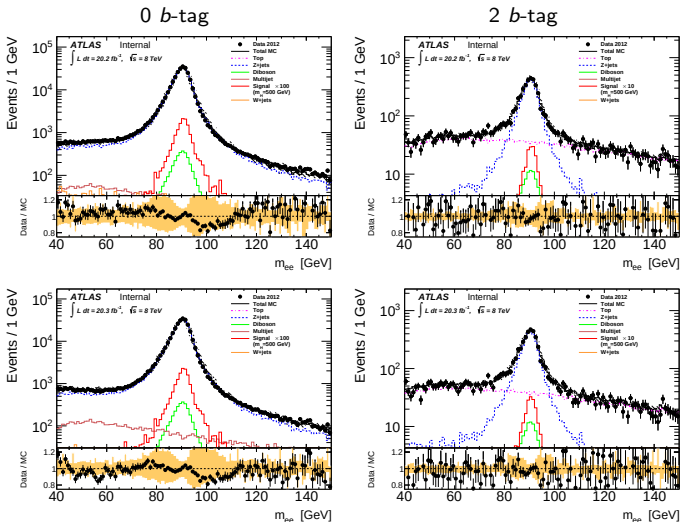
- Now have full data with updated selection/corrections
 - Show some plots with systematics and QCD
- New ntuples also have 1 jet events
 - Show some results on data/MC modelling
 - Have been working with Francesco to agree on numbers
- Have now implemented nominal VBF interference reweighting
 - Rikard is working on reweights for alternative widths
- Have updated cut flows on twiki for new selection
 - Both data and MC
- Producing new limits inputs now
 - Also containing some reweighted width signals and CRs for flavour fit



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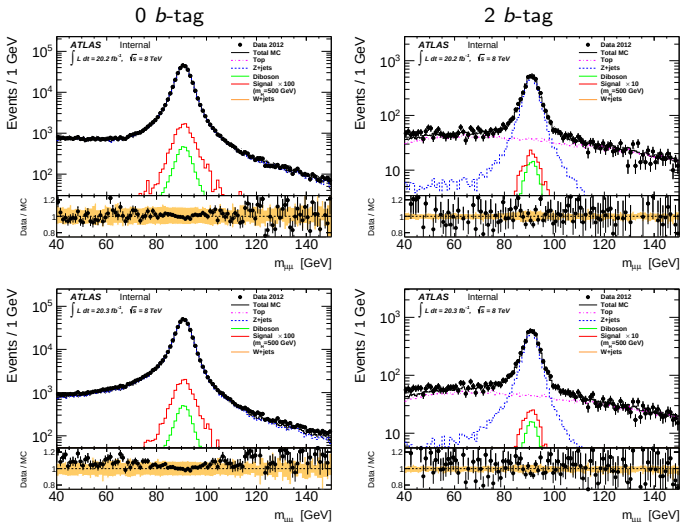
m_{ll} (elec)

- Some increase in QCD but still negligible

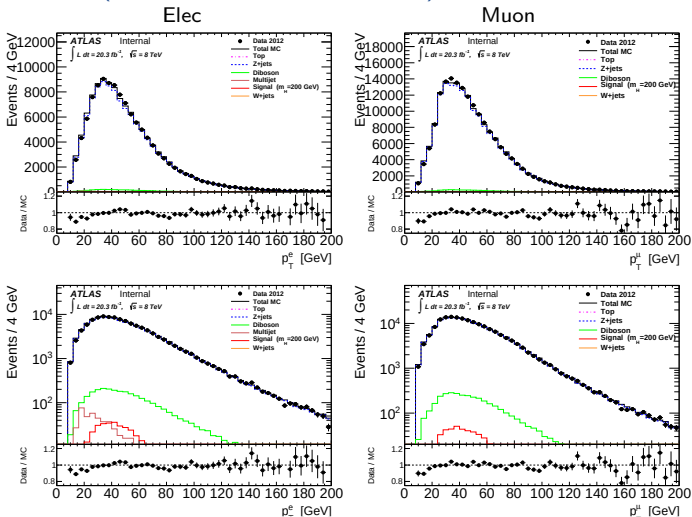


m_{ll} (muon)

- Some increase in QCD but still negligible

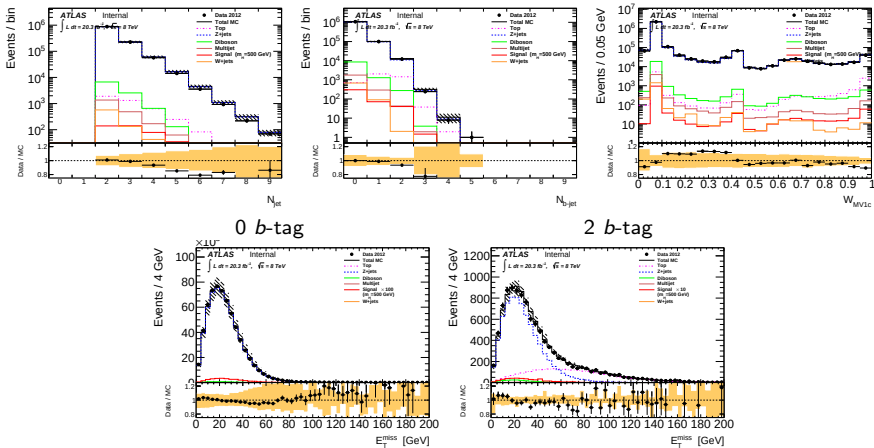


- p_T^l for 0 tag (missing others due to bug) after final cuts

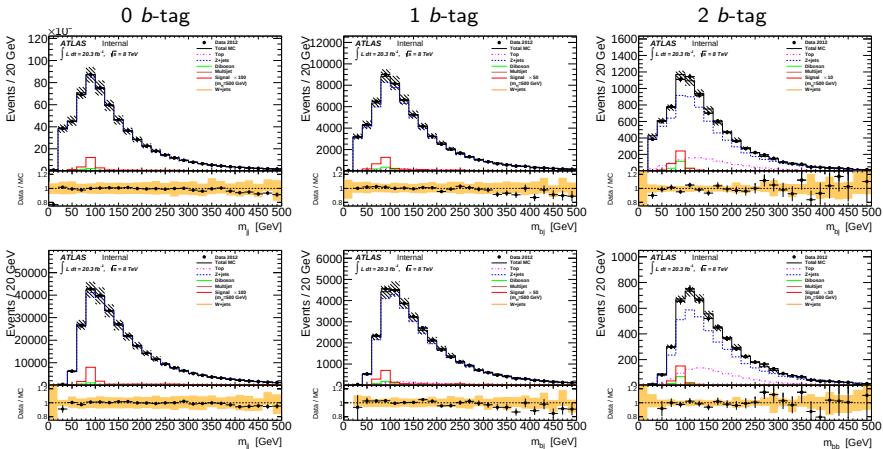


Jet + E_T^{miss}

- Slope in Data/MC for N_{jet} but 2 and 3 jet OK
- E_T^{miss} reasonably described but some slope

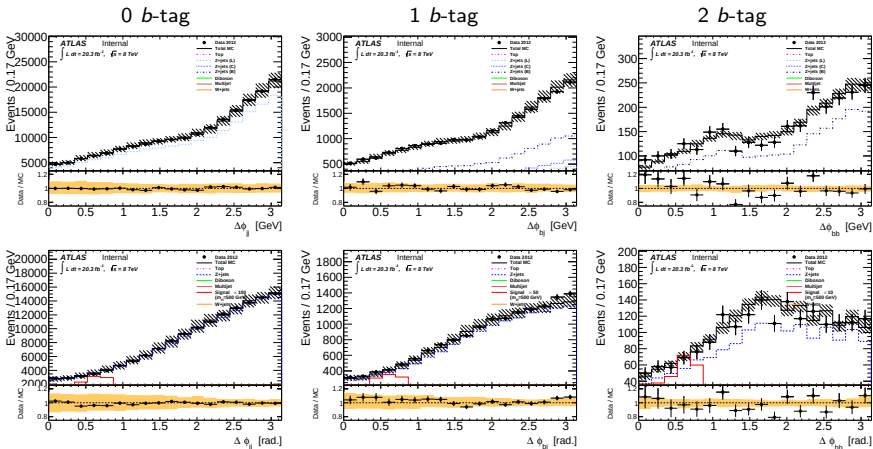


- Before (top) and after (bottom) optimised cuts
 - Some slope in ratio for 0/1 tag but SB only up to $m_{jj} = 180$ GeV

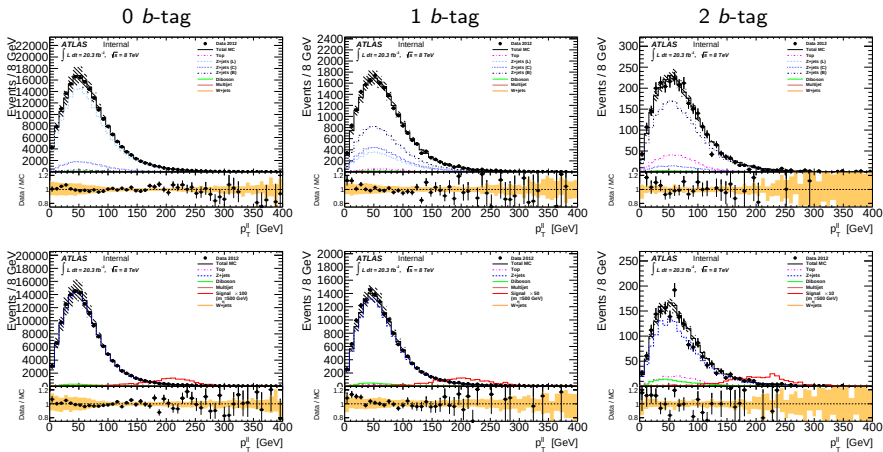


$$\Delta\phi_{jj}$$

- Good description of $\Delta\phi_{jj}$ after reweight
 - Both in SB (top) and SR (bottom)



- P_T^Z in SB (top) and SR (bottom) also improved by $\Delta\phi_{jj}$ reweight



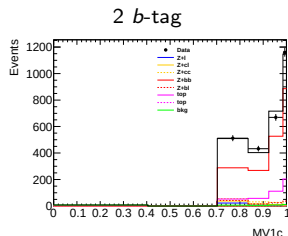
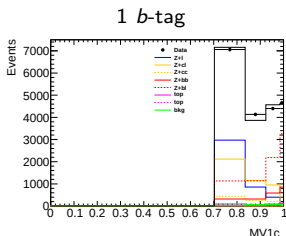
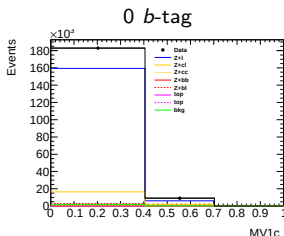


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Flavour Fit

- Use MV1C weights for first jet (consistent results for sum of weights)
 - Use both m_{ll} SBs and $e\mu$ CR for top to increase statistics

Zb SF	1.19707e+00	3.24557e	Zl
Zbl SF	1.00805e+00	2.07823e	Zc
Zc SF	9.34955e-01	2.75062e	Zbl
Zl SF	1.00268e+00	4.45123e	Zbb
Top SF	1.04883e+00	9.42482e	Top
			Other bkg

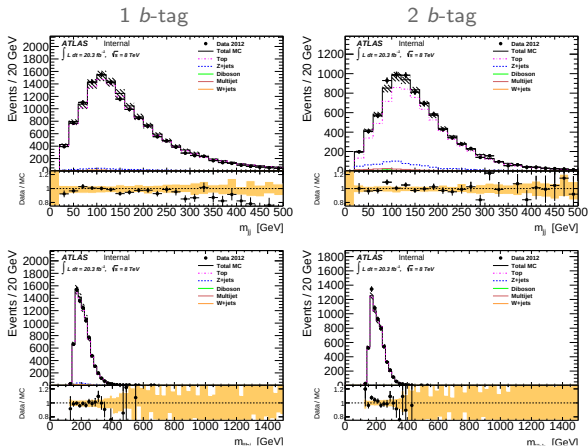


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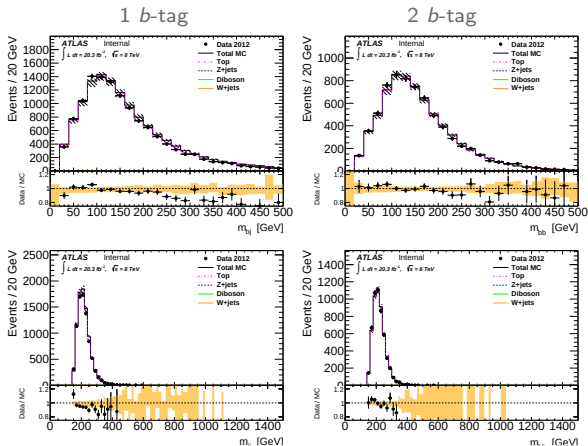
Top CR (SBs)

- m_{ll} SBs before (top) and after (bottom) optimised cuts
 - $40 < m_{ll} < 76$ GeV or $m_{ll} > 106$ GeV + $E_T^{\text{miss}} > 60$ GeV for 1 b -tag
- Good normalisation for both



Top CR ($e\mu$)

- $e\mu$ events with $50 < m_{ll} < 150$ GeV $\rightarrow$ increased stats
 - Opposite sign only + $E_T^{\text{miss}} > 60$ GeV for 1 b -tag (remove QCD)
- Very consistent picture for Data/MC in $e\mu$ and SBs

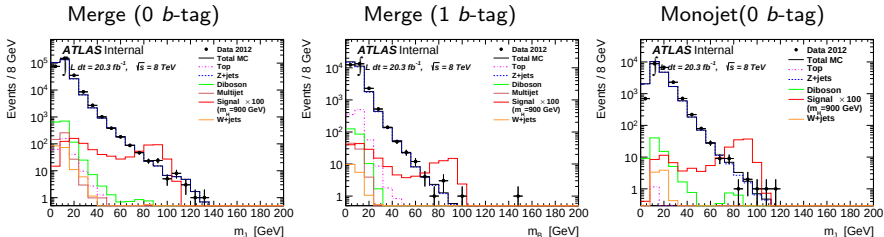




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Merged: m_J

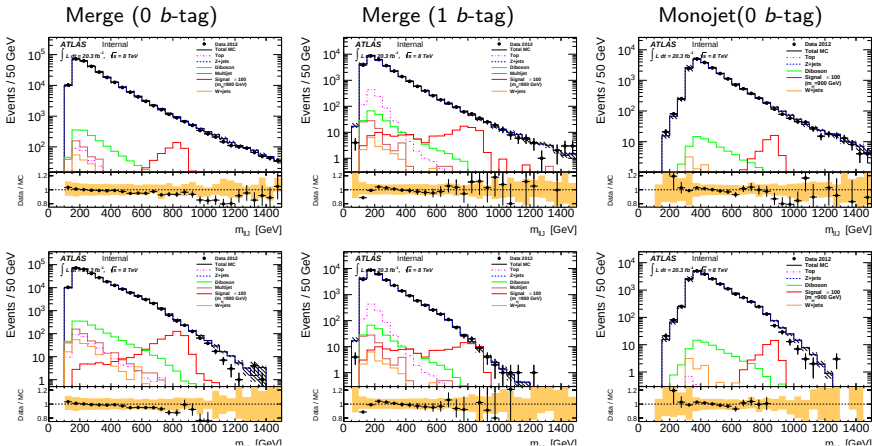
- Results separated into Merged (0/1 tag) and monojet for now
 - Agreed to combine but want to see agreement in each region.
- Some discrepancy at low m_J for monojet



- Define SB as $m_J < 60$ GeV (SR starts at 70 GeV) ...

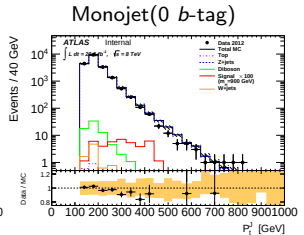
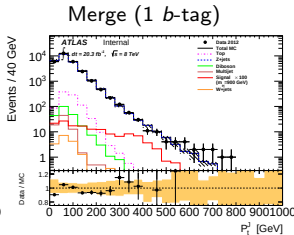
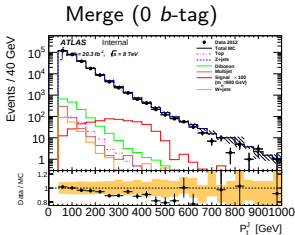
Merged: SB

- M_{llJ} before (top) and after (bottom) p_T^Z cut (not in 1 tag)
- See some discrepancy at high m_{llJ} after optimised cuts
 - Francesco doesn't seem to see



Merged: SB (2)

- $p_T^\perp$ before p_T^Z cut
- Also see discrepancy at high $p_T^\perp$

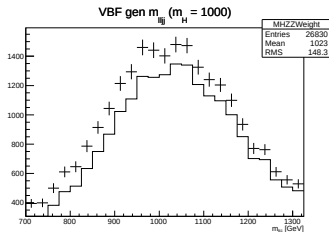
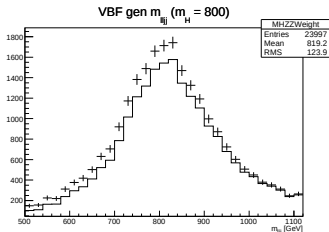
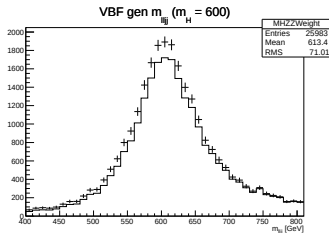
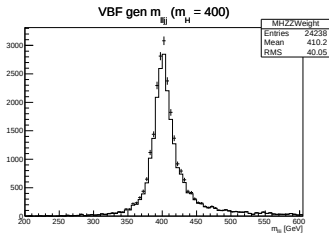




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VBF Interference Reweight

- First go at implementing VBF reweight
 - Need to check if should really change normalisation



Summary



- Updated results with most things in place for ggF
- Missing:
 - VBF/ggF reweights for varying widths
 - Finalisation of all systematics
 - Limits