Top-quark charge asymmetry in $t\bar{t} + jets$ events

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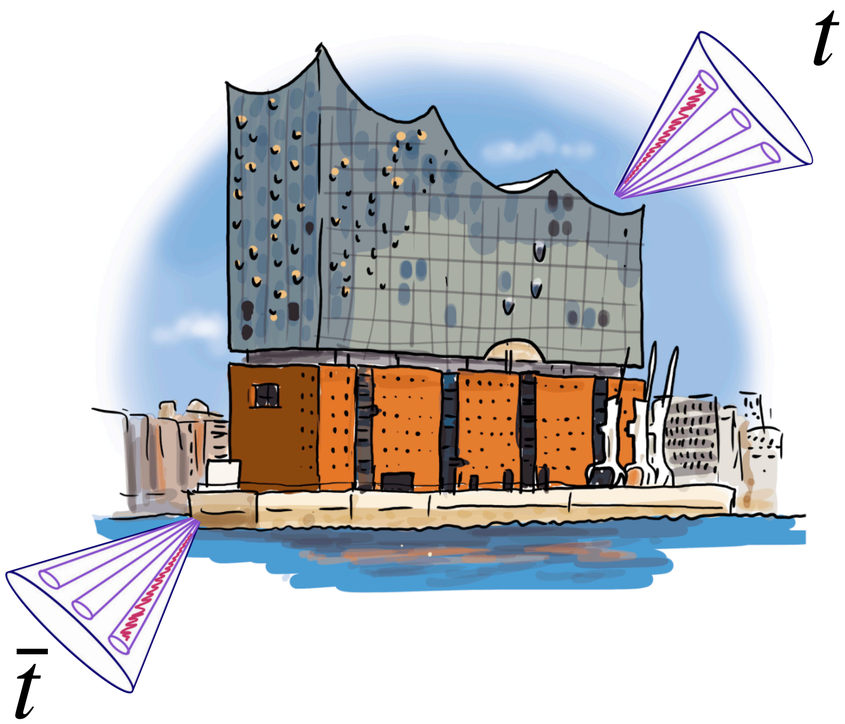
Action items after pre-approval



Action items from pre-approval talk:

- A_E and others: Compare if the templates for nuisances (xsec_st, FSR, PU) show real asymmetry
- Correct for factor 100 on results in slides/documentation
- Split JEC
- use theory NNLO/NLO ratio for top p_T reweighting
- check if you gain sensitivity by loosening the fiducial definition

What has changed since pre-approval

JEC 27 sources included - (FlavorQCD is also separated into Gluon,Bottom,Quark,Charm)

Taking into account the correlation across years as recommended

HLT uncorrelated across years

Top-pt-rew. changed from the data to theory based weights

Xsec unc. of ST and Wjets reduced form 30% to 15%

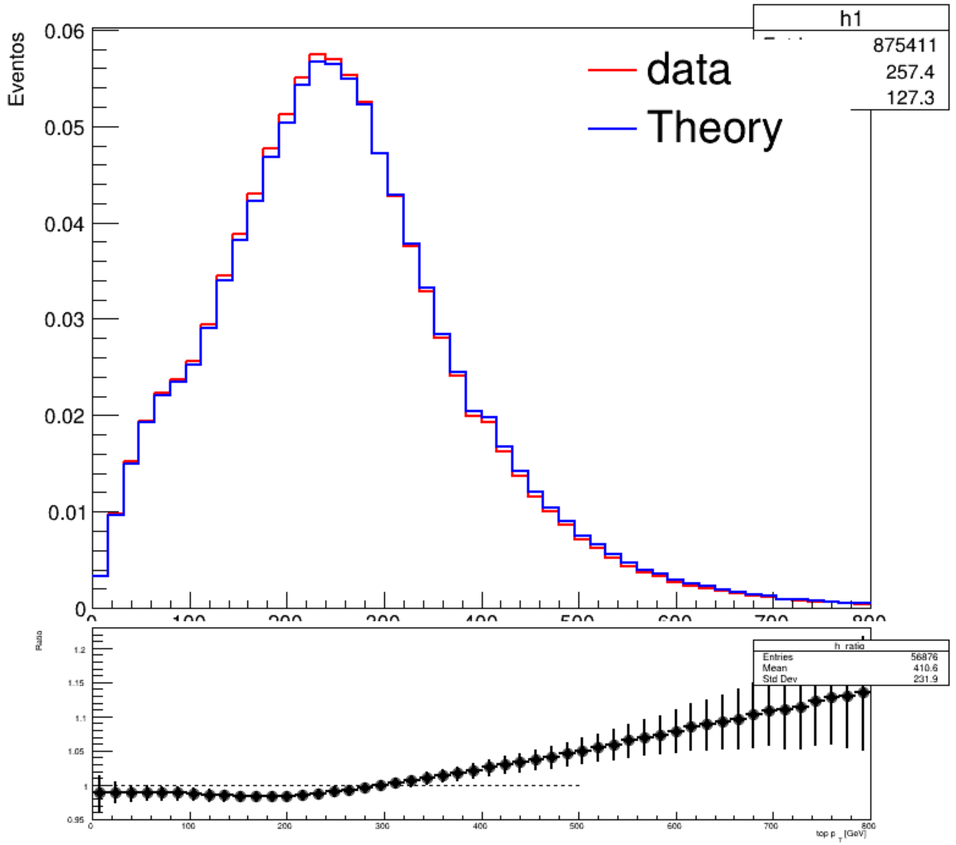
Relaxed definition of the fiducial-phase space (to mimic ATLAS)

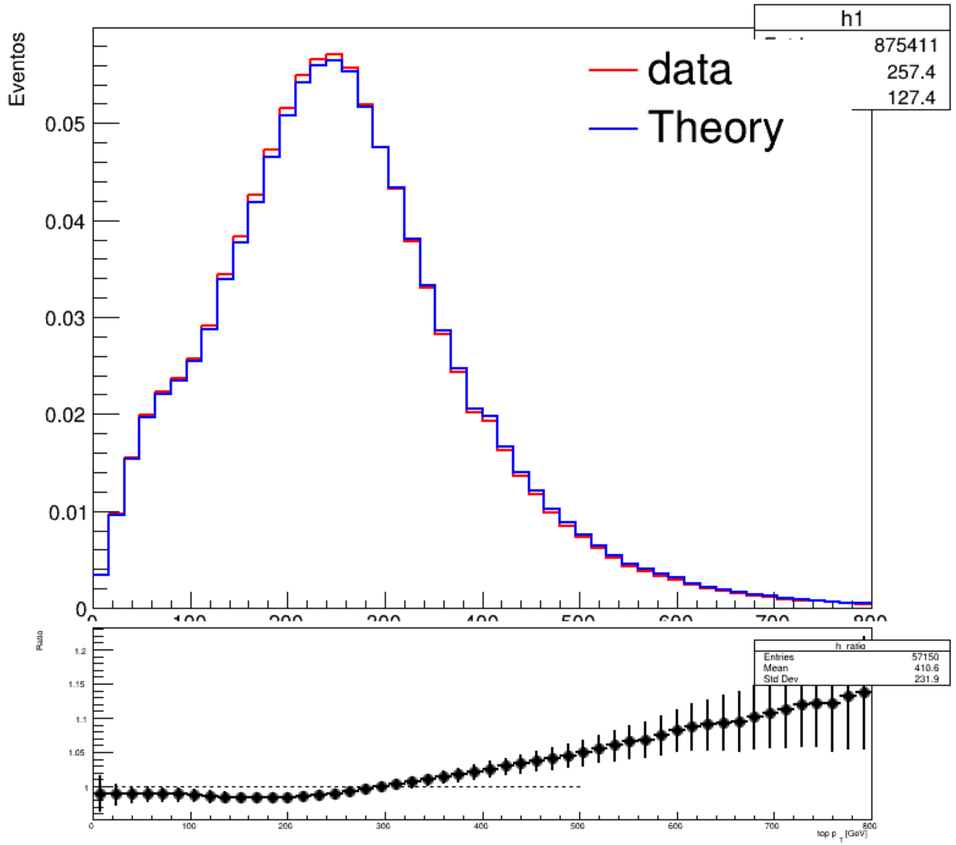
- jet_pt > 5GeV
- No Gen M_tt cut

Comparison of old pt-rew vs new pt-rew

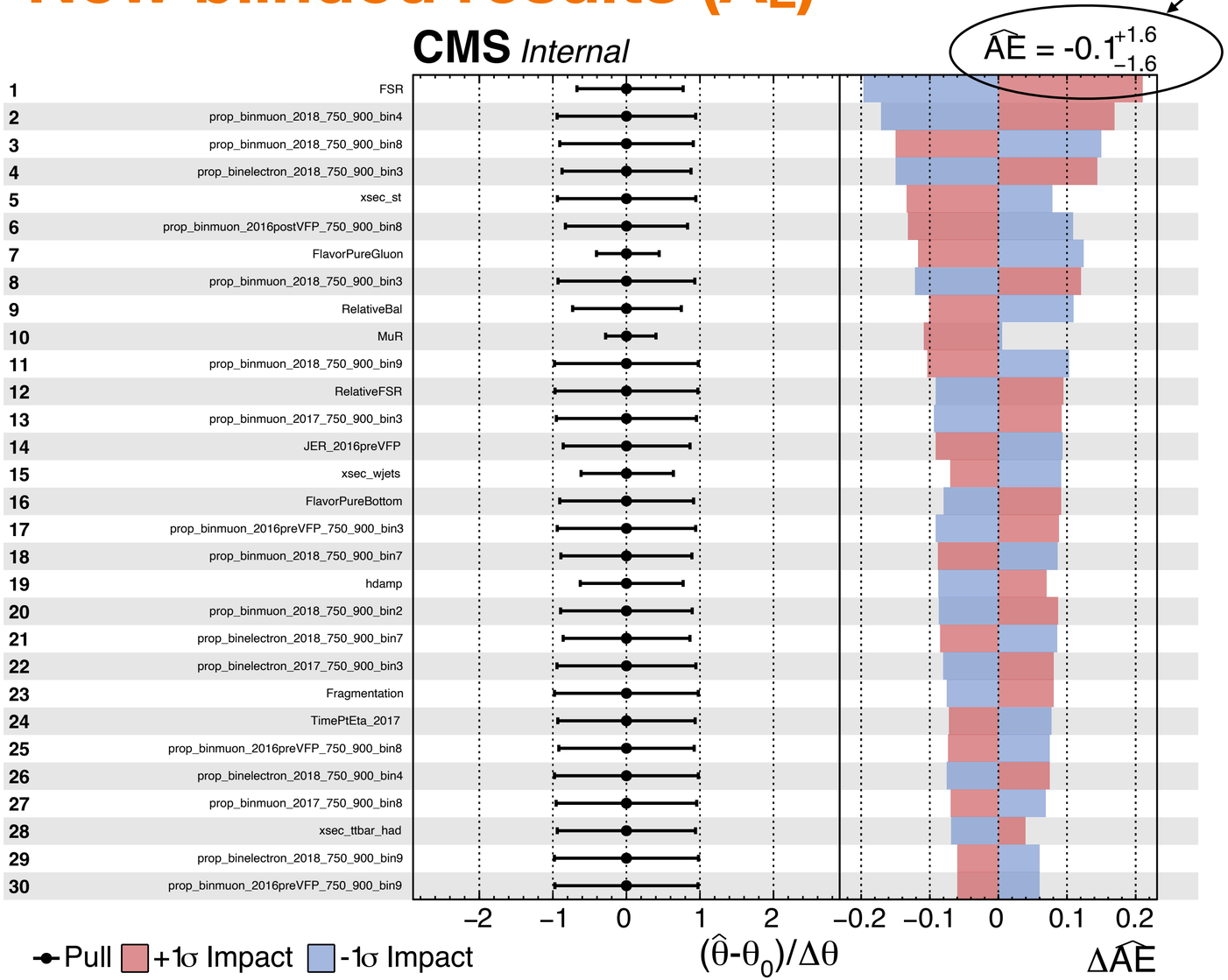
Change was done as requested, major change after pt> 500 GeV.

Peak ~ 200 GeV. Data MC agreement still looks good. (Se next slide)





New blinded results (A_E)

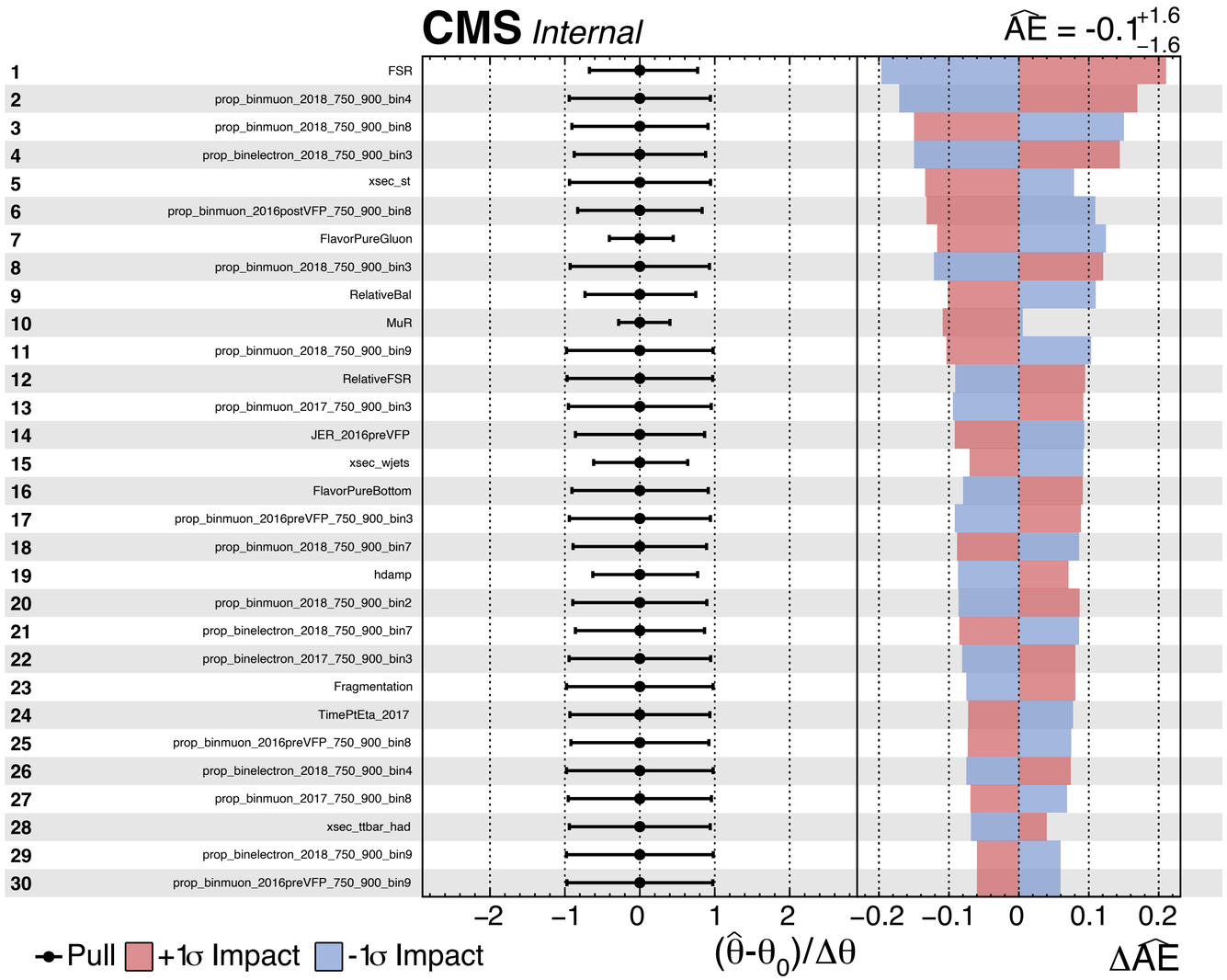


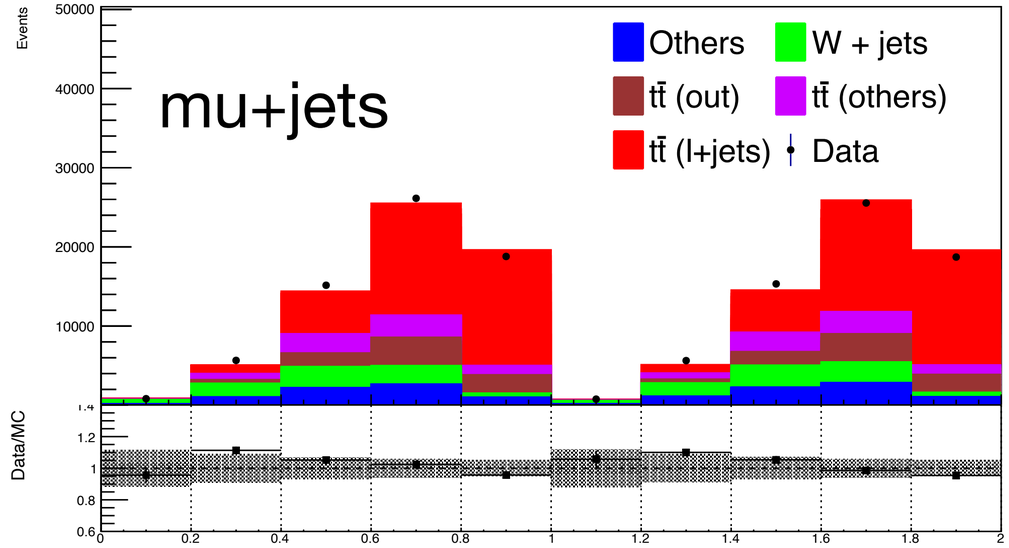
More competitive uncertainty

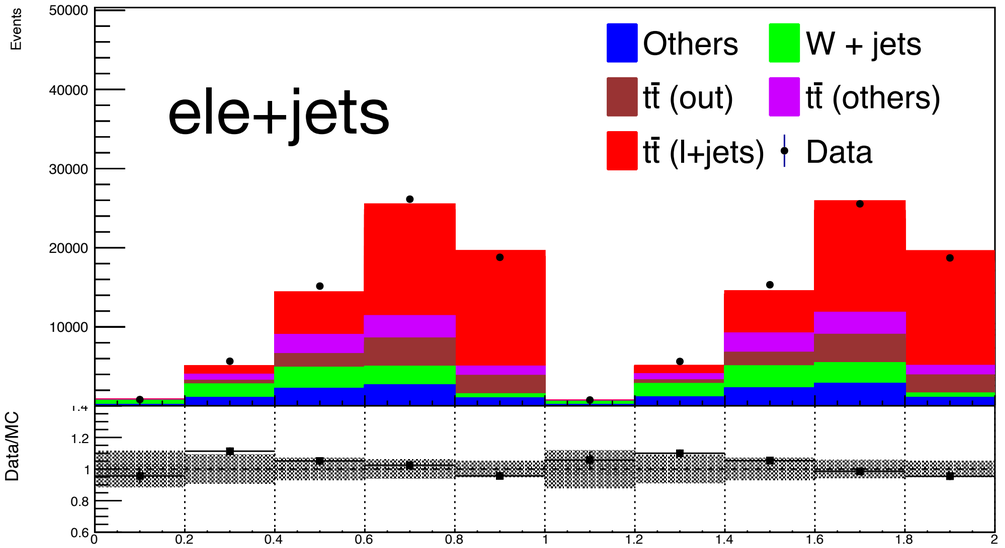
Mostly coming from the new definition of fiducial phase space.

More events enter in tt “signal”

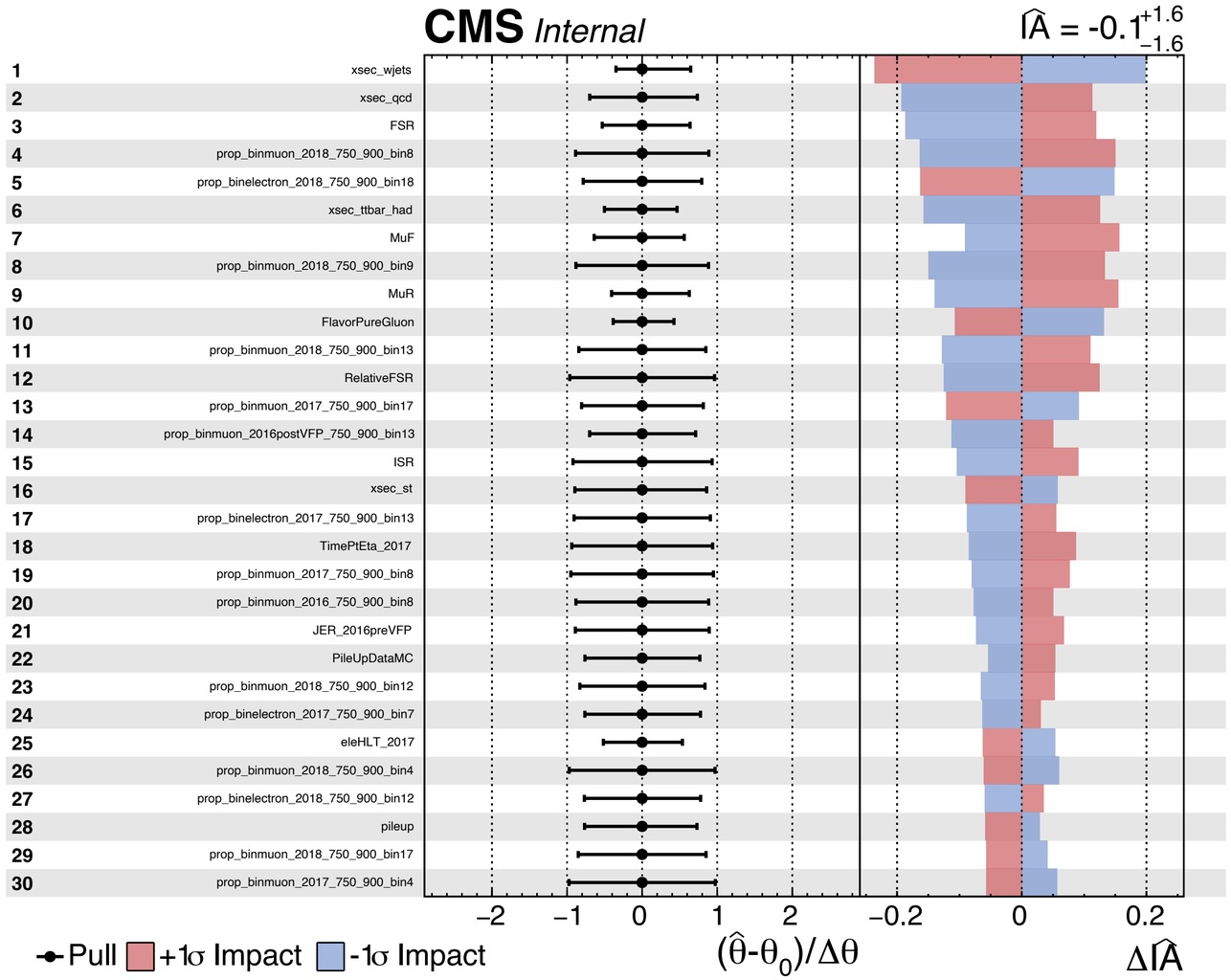
New blinded results (A_E)

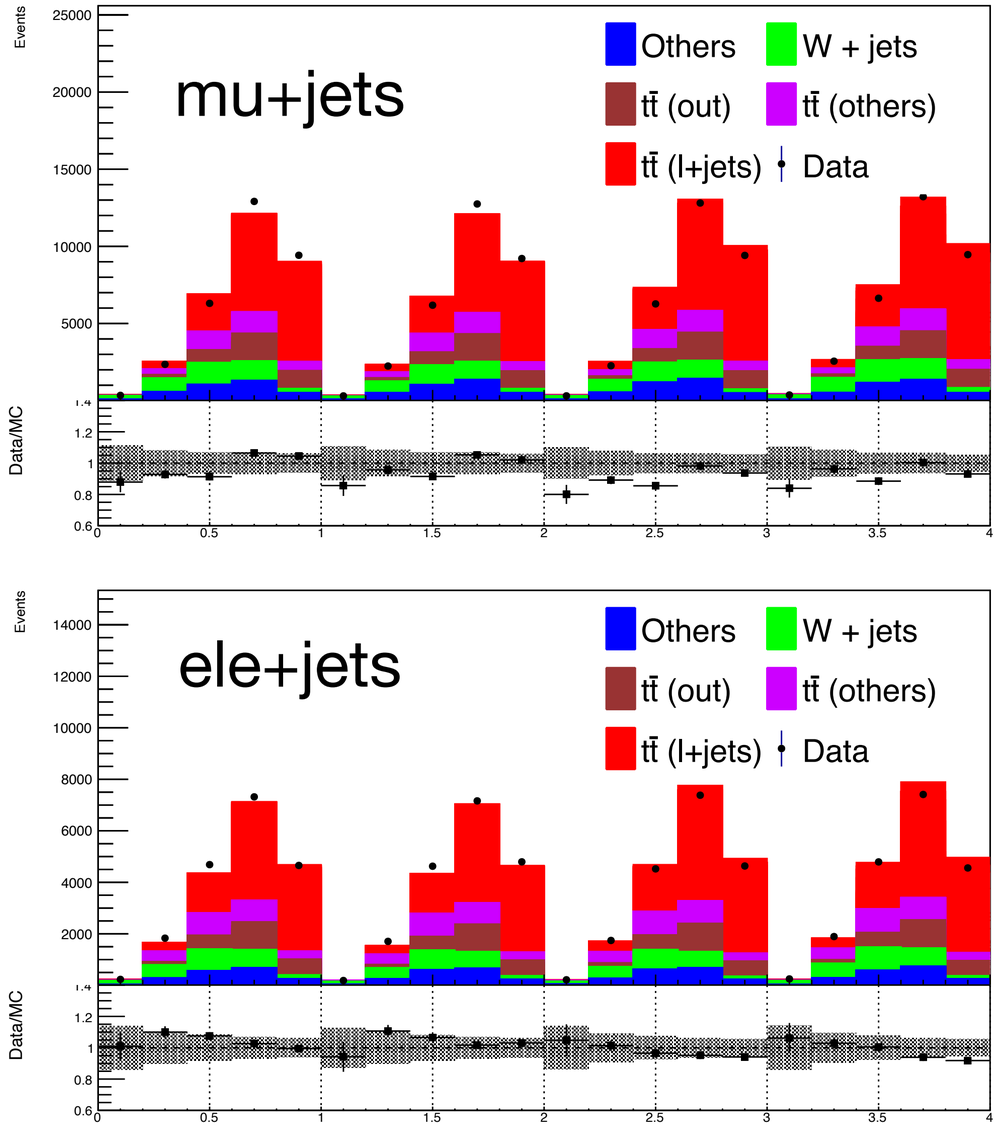






New blinded results (A_l)





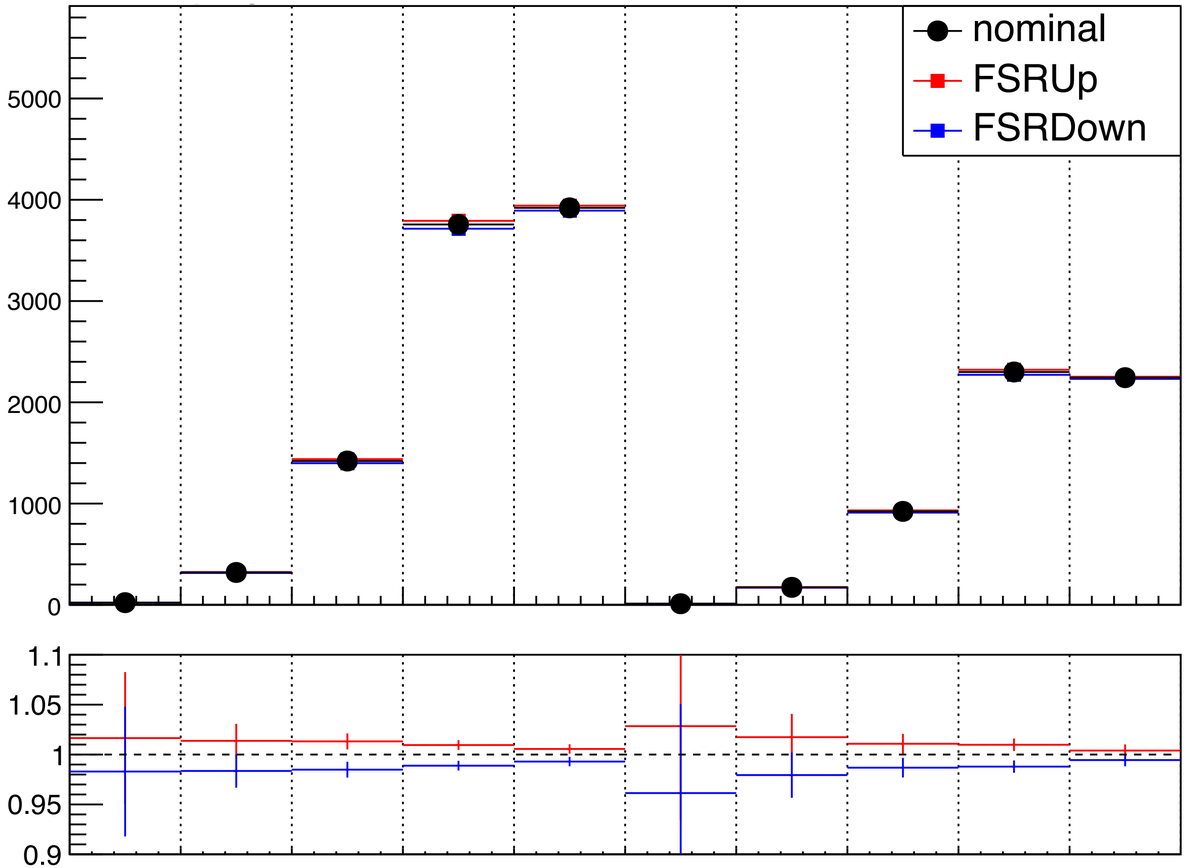
FSR up/down distributions: Except for 2016 postVFP (where the effect is small but not negligible), there is generally no overlap, so the effect is not caused by statistical fluctuations.

After the changes, the nuisance parameter xsec_st remains high, dropping from 2nd to 7th after reducing the uncertainty from 30% to 15%. ATLAS quotes 5%, but that's for an inclusive measurement and they are a boosted regime, which I think isn't entirely correct. I prefer keeping it at 15% to account for potential mismodelings in my phase space.

*In the new version of the AN and paper, asymmetries are reported as %

FSR up/down distributions

2018_muon



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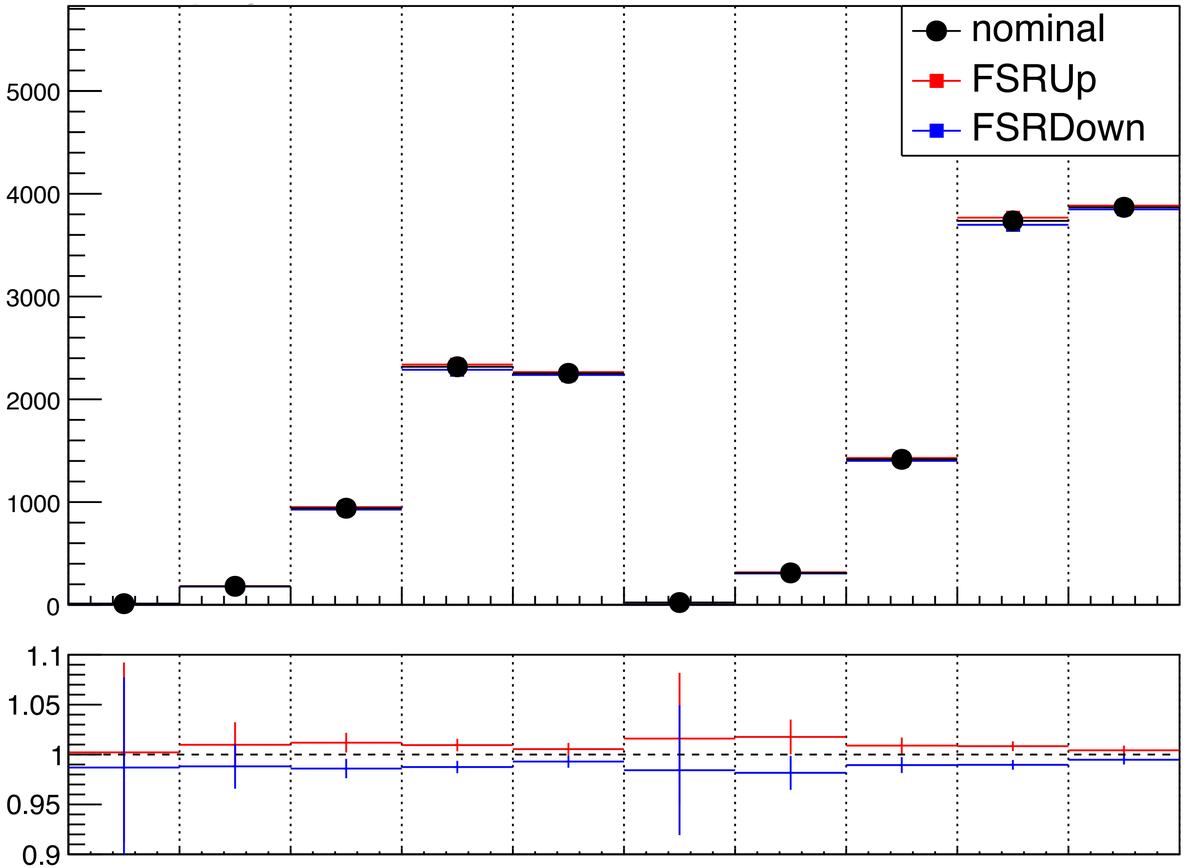
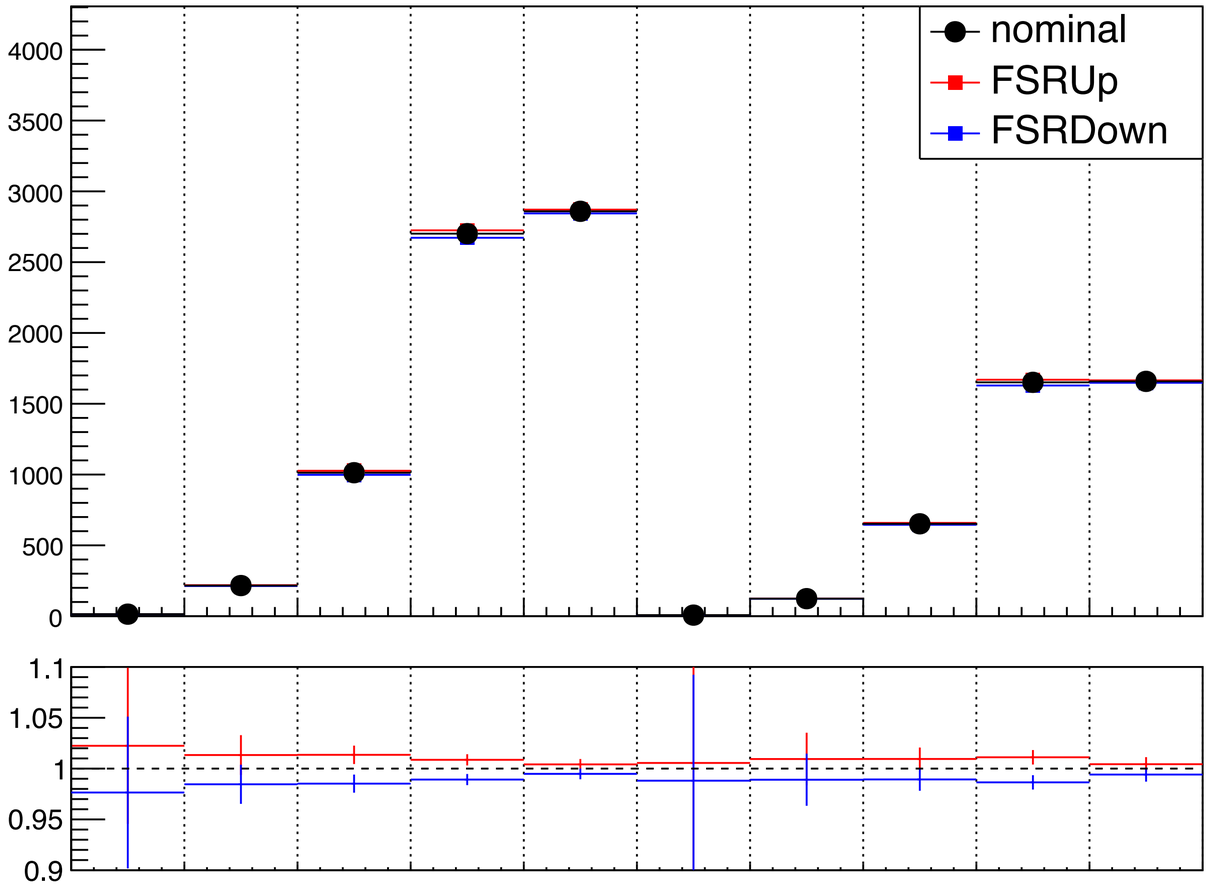
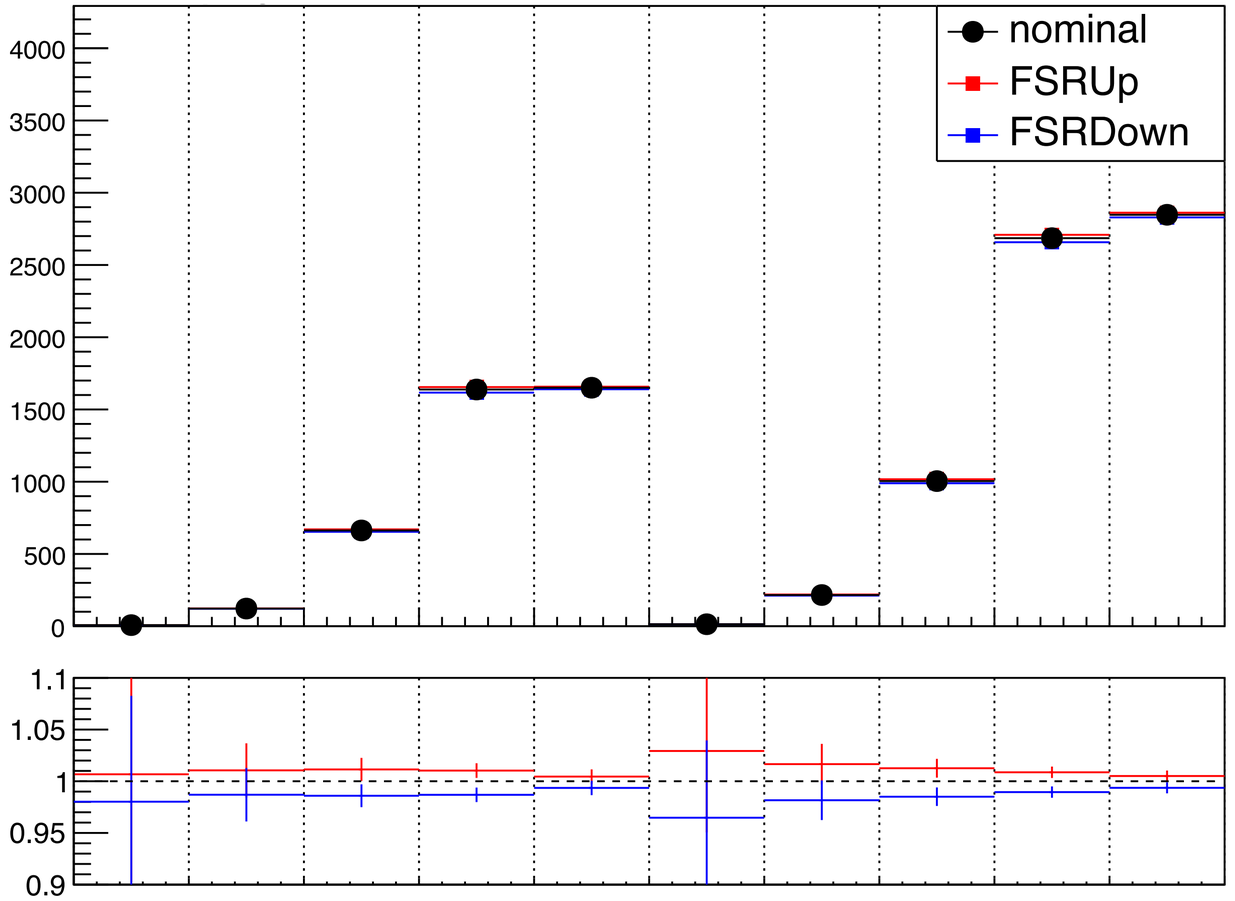


FSR up/down distributions

2017_muon

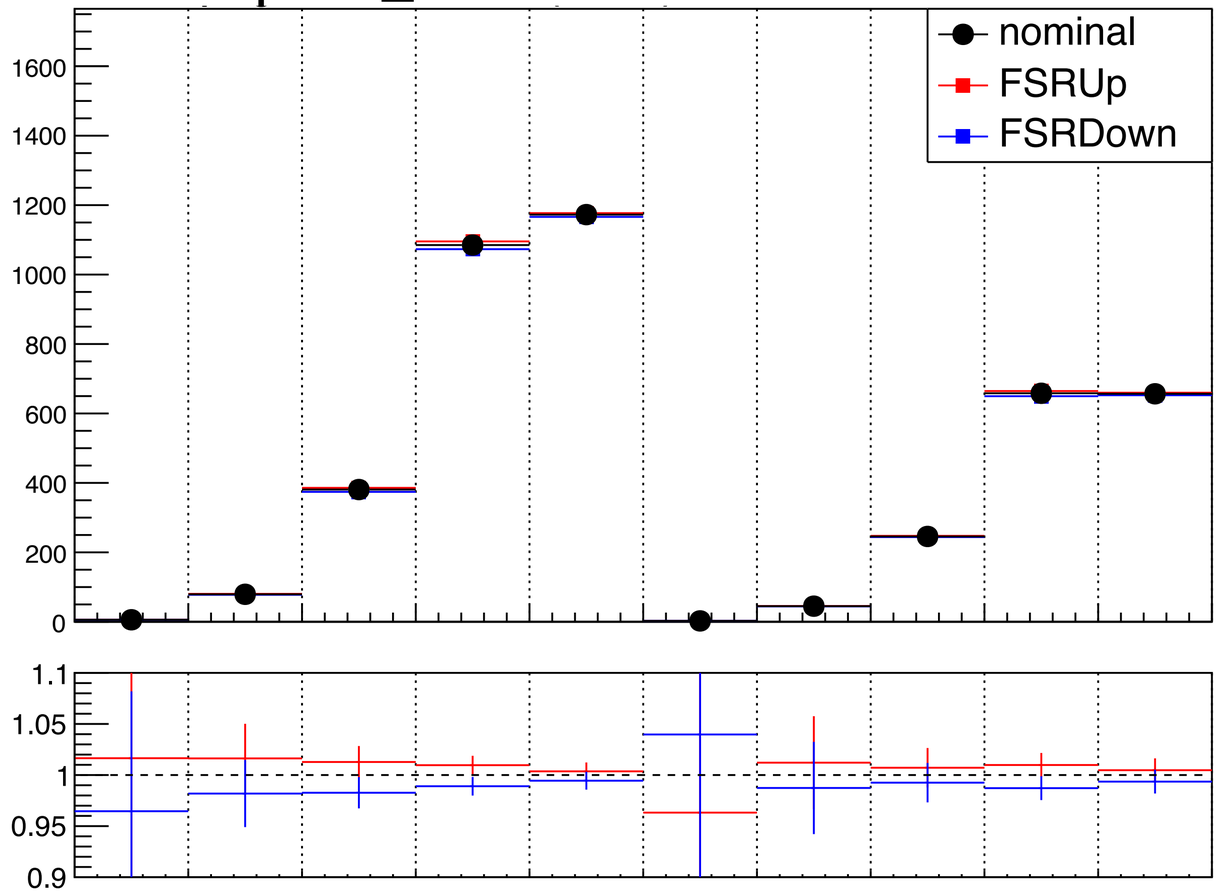


2017_muon



FSR up/down distributions

2016post_muon



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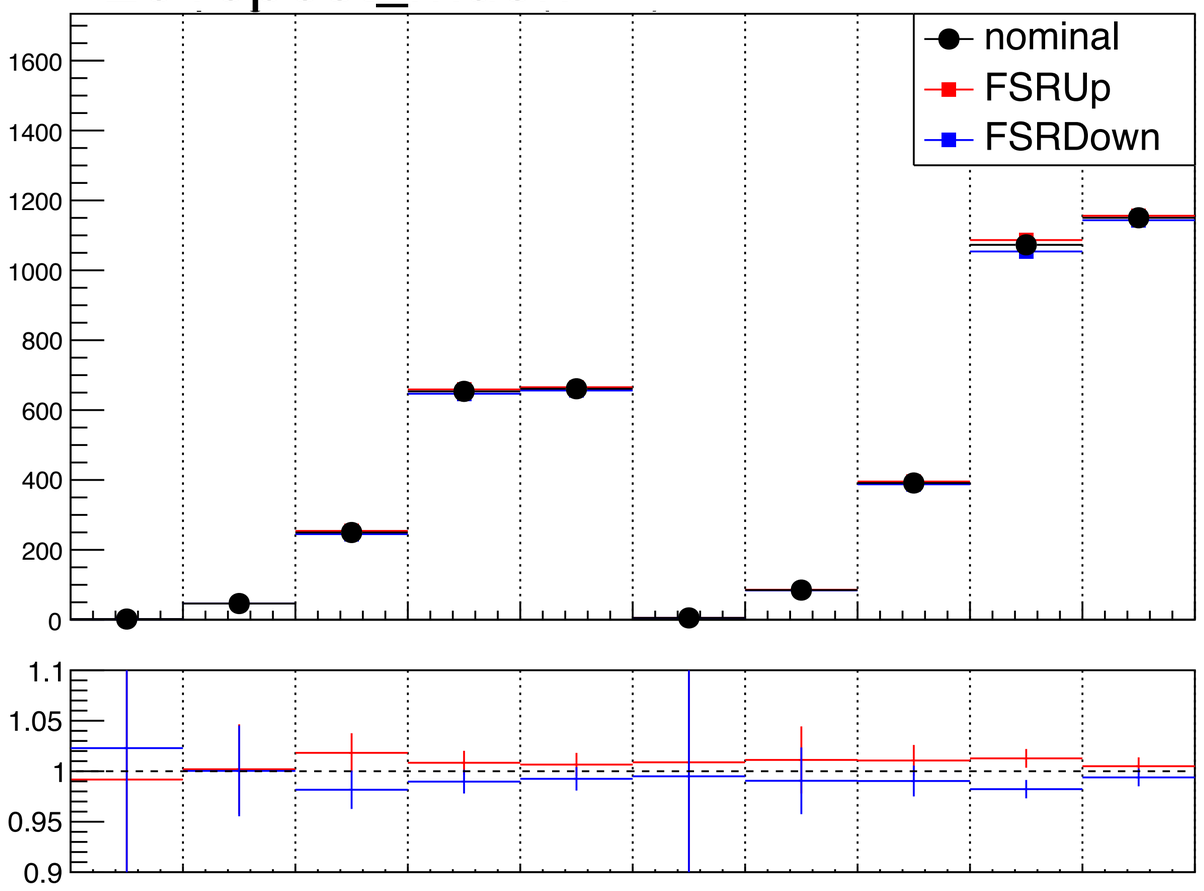
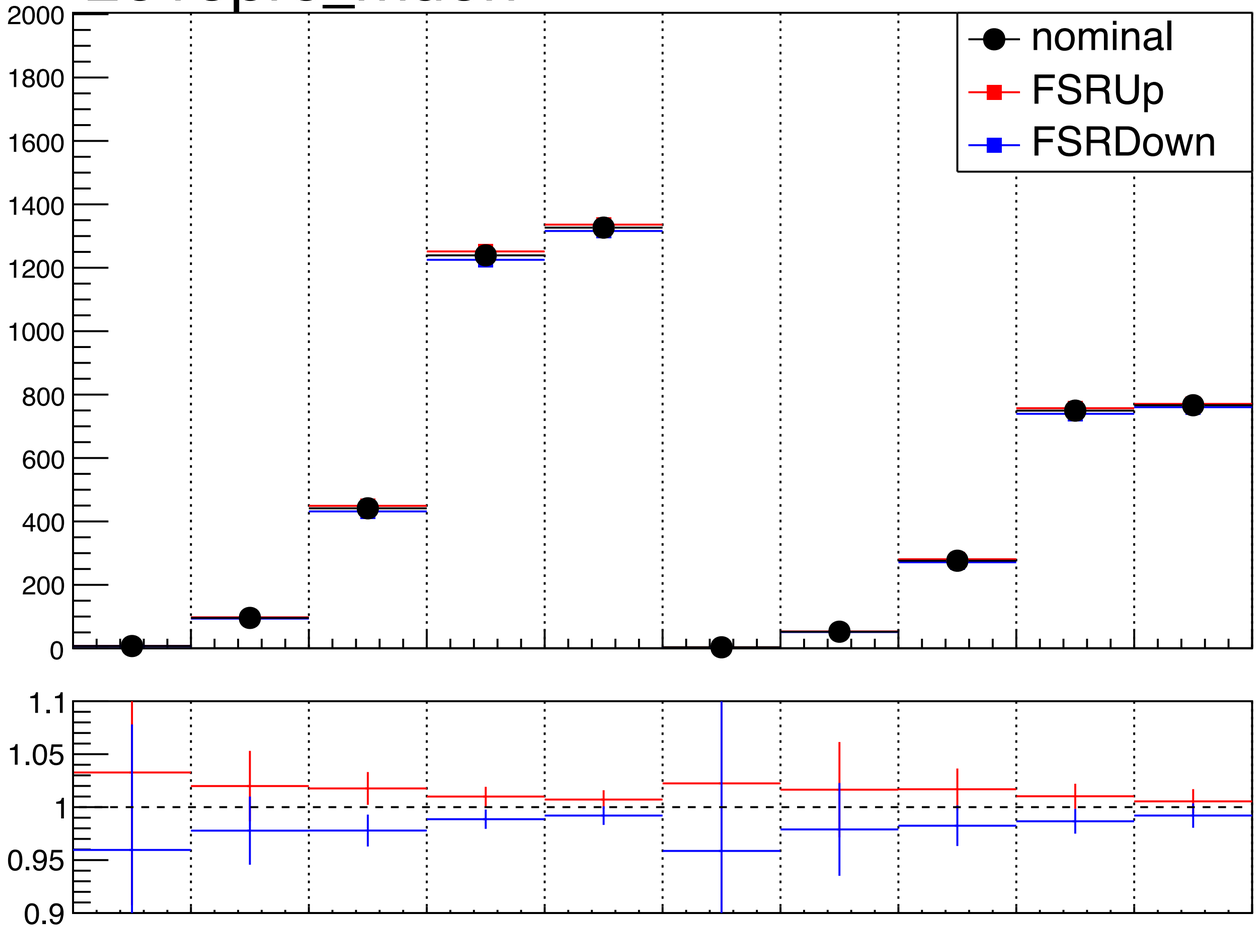


FSR up/down distributions

2016pre_muon



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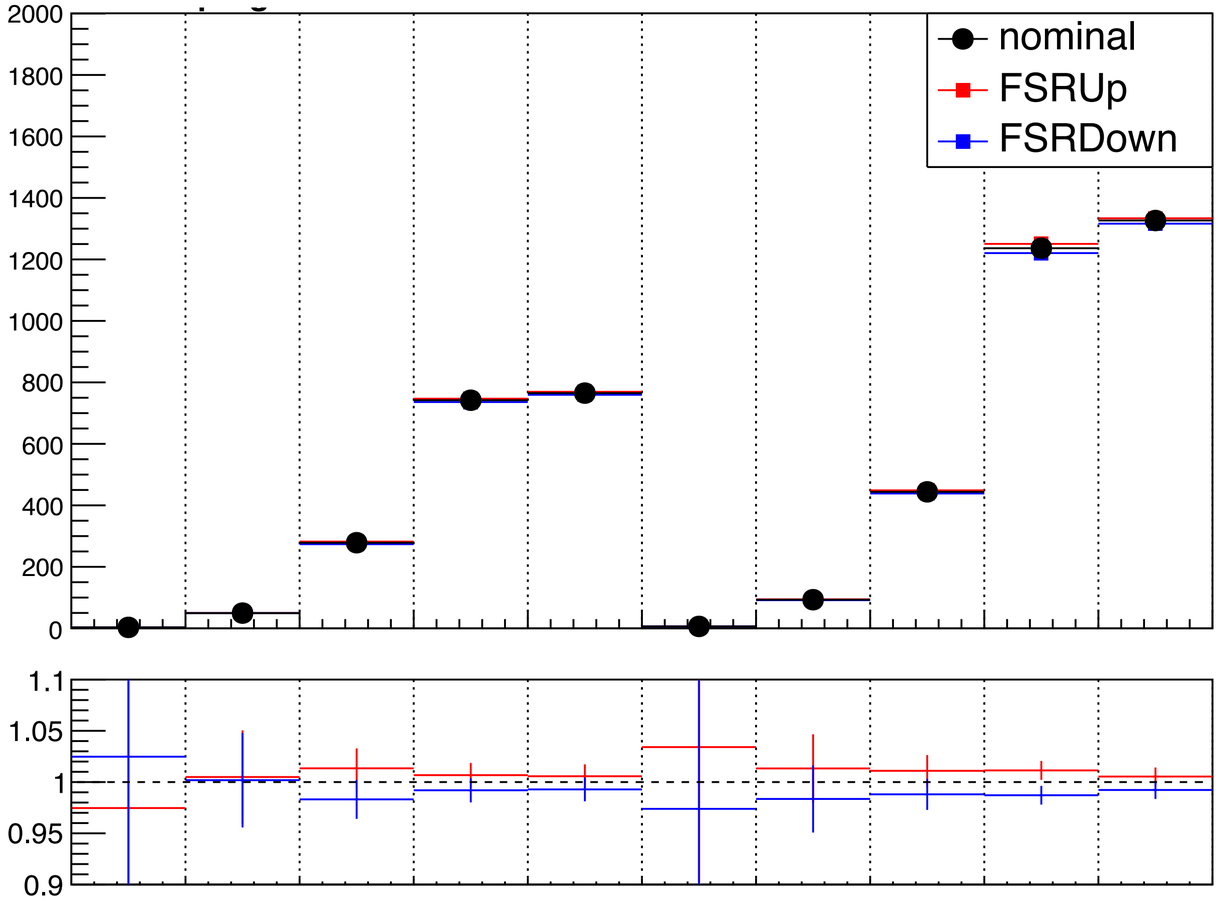

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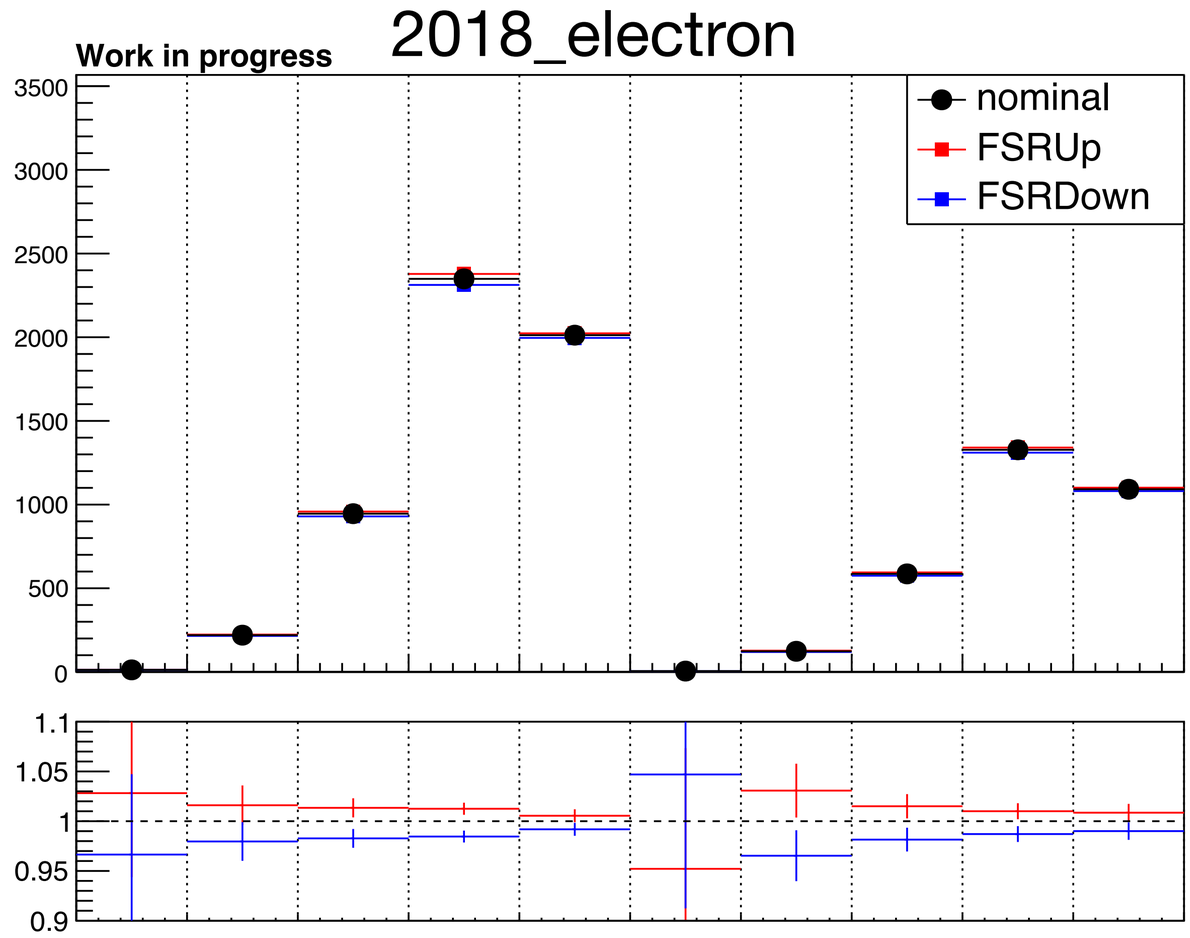
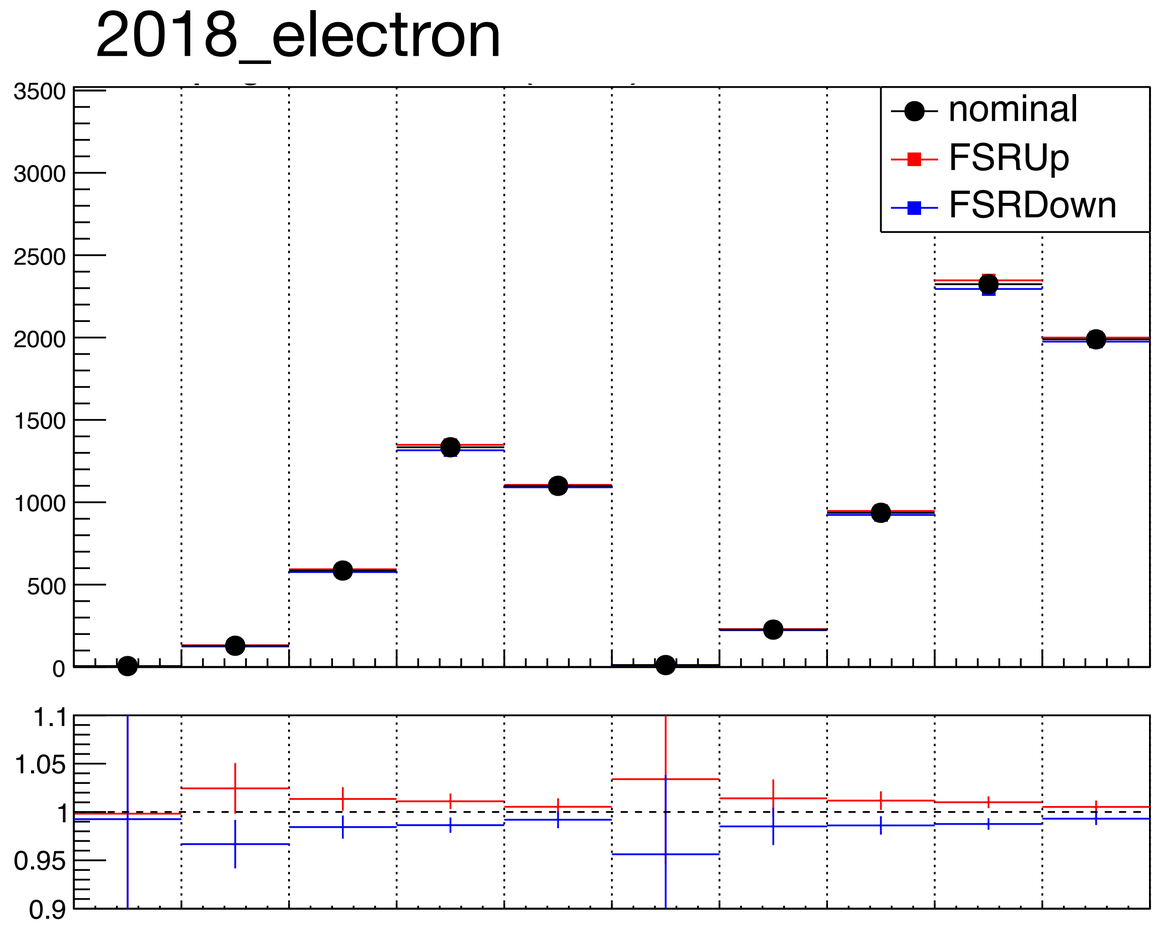
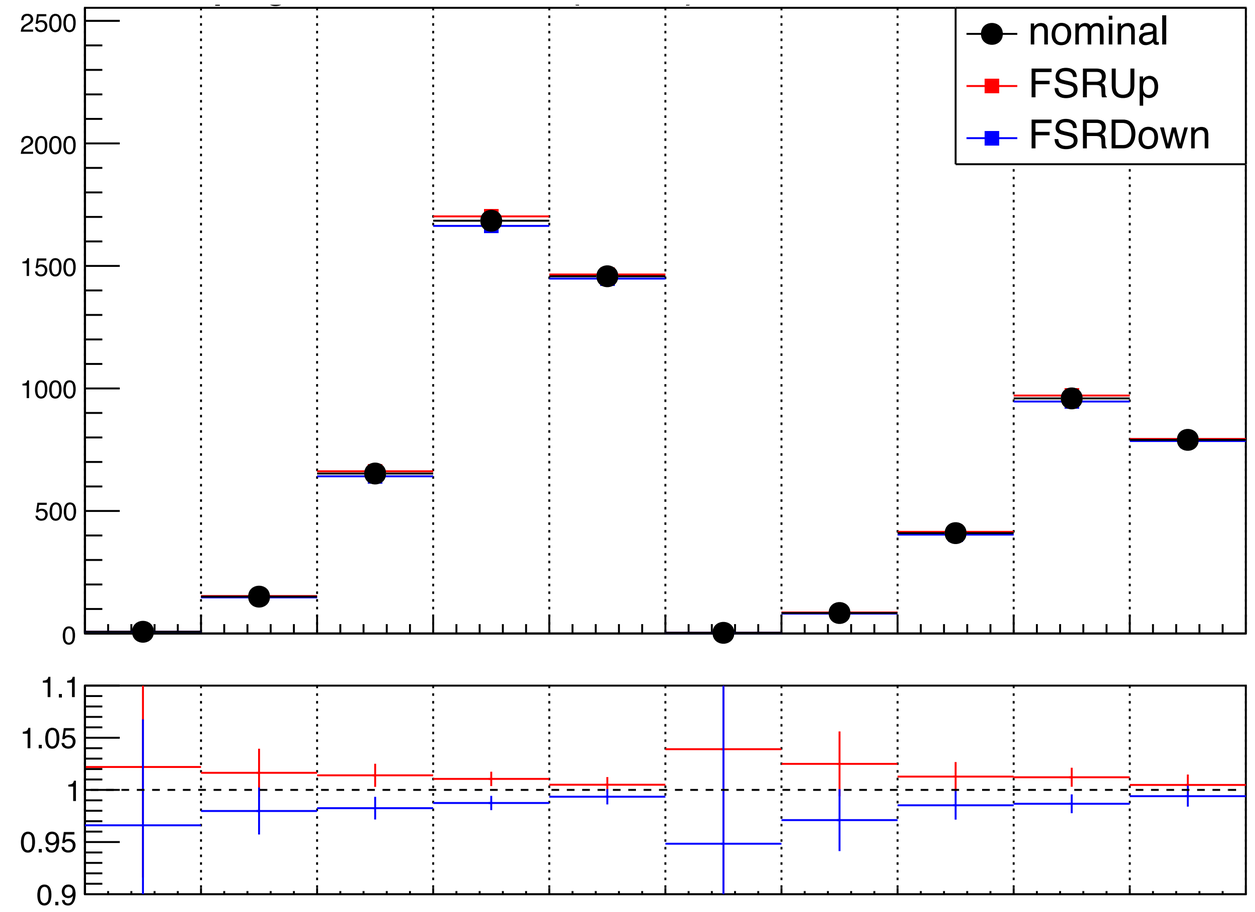


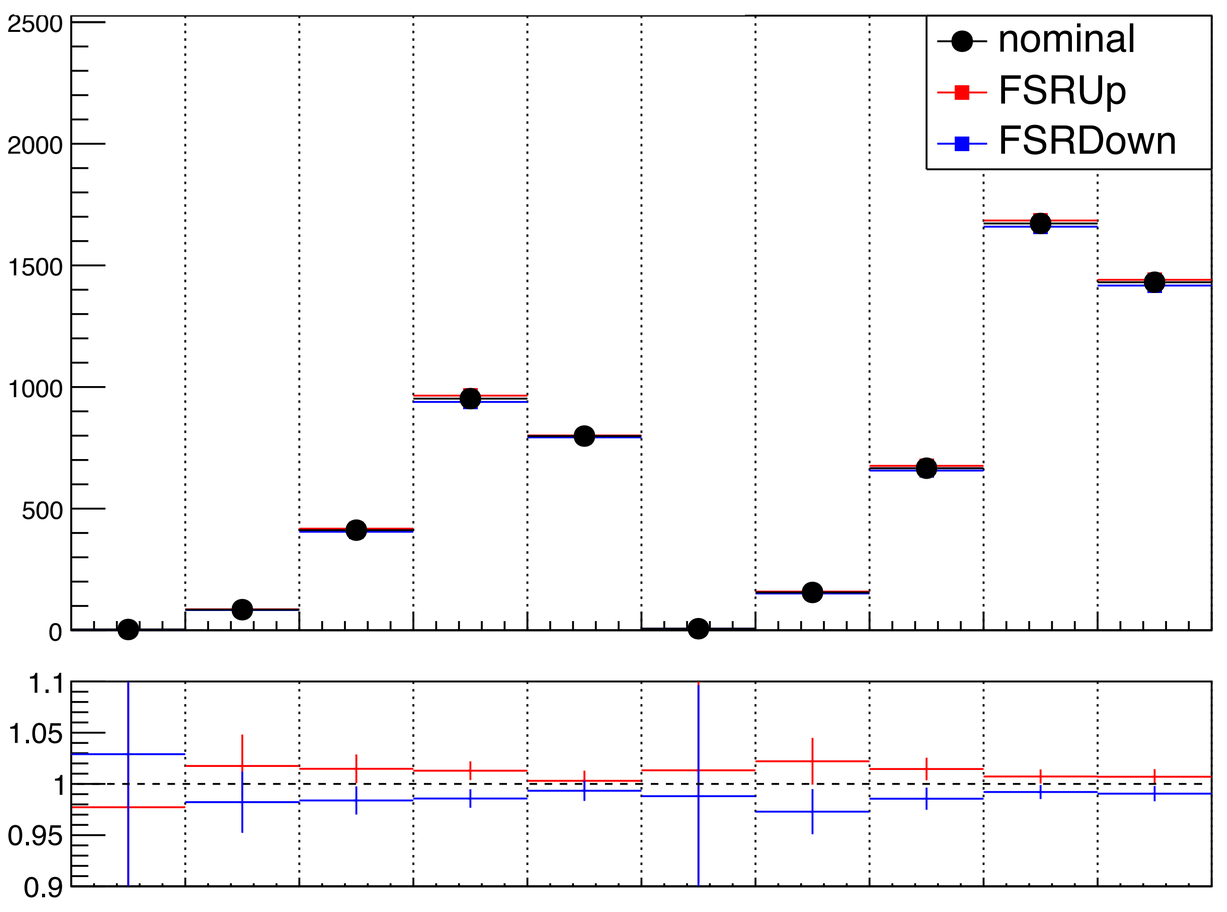


FSR up/down distributions

2017_electron

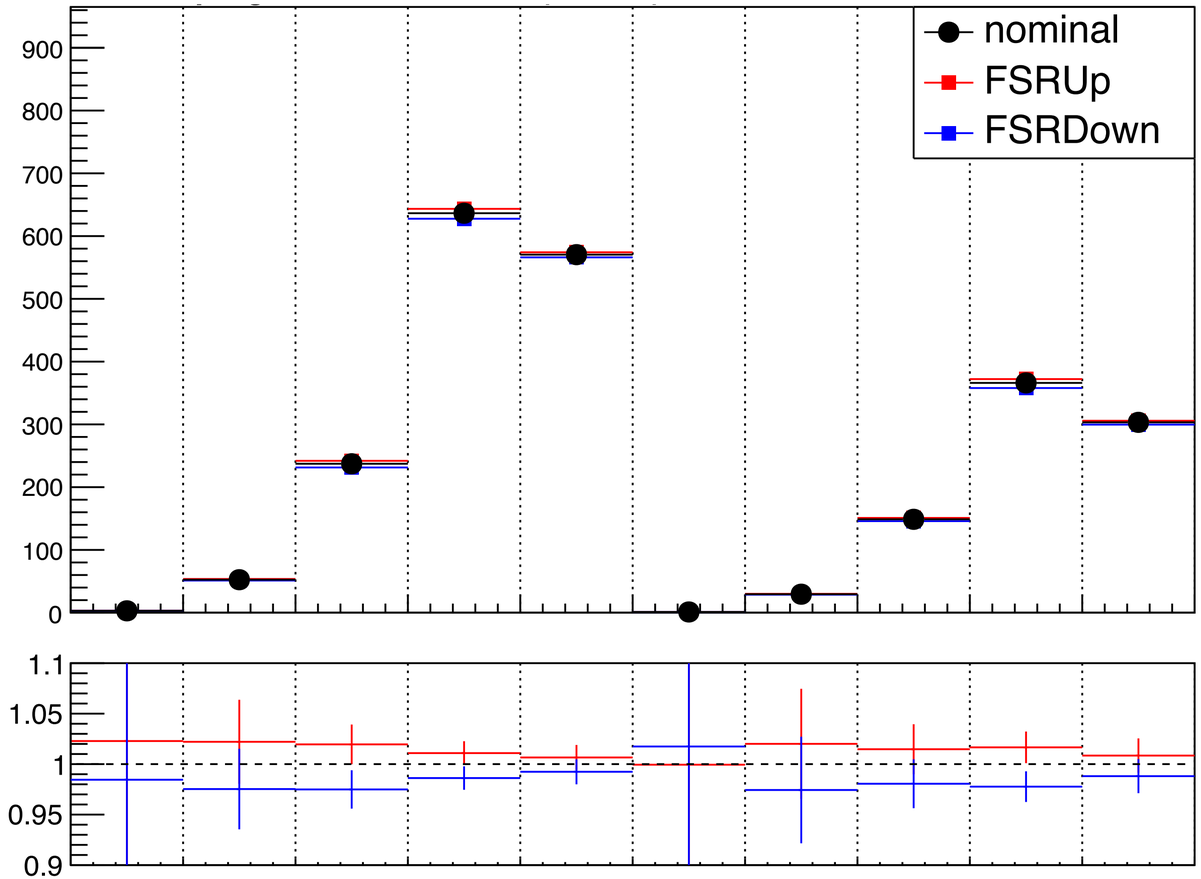


2017_electron

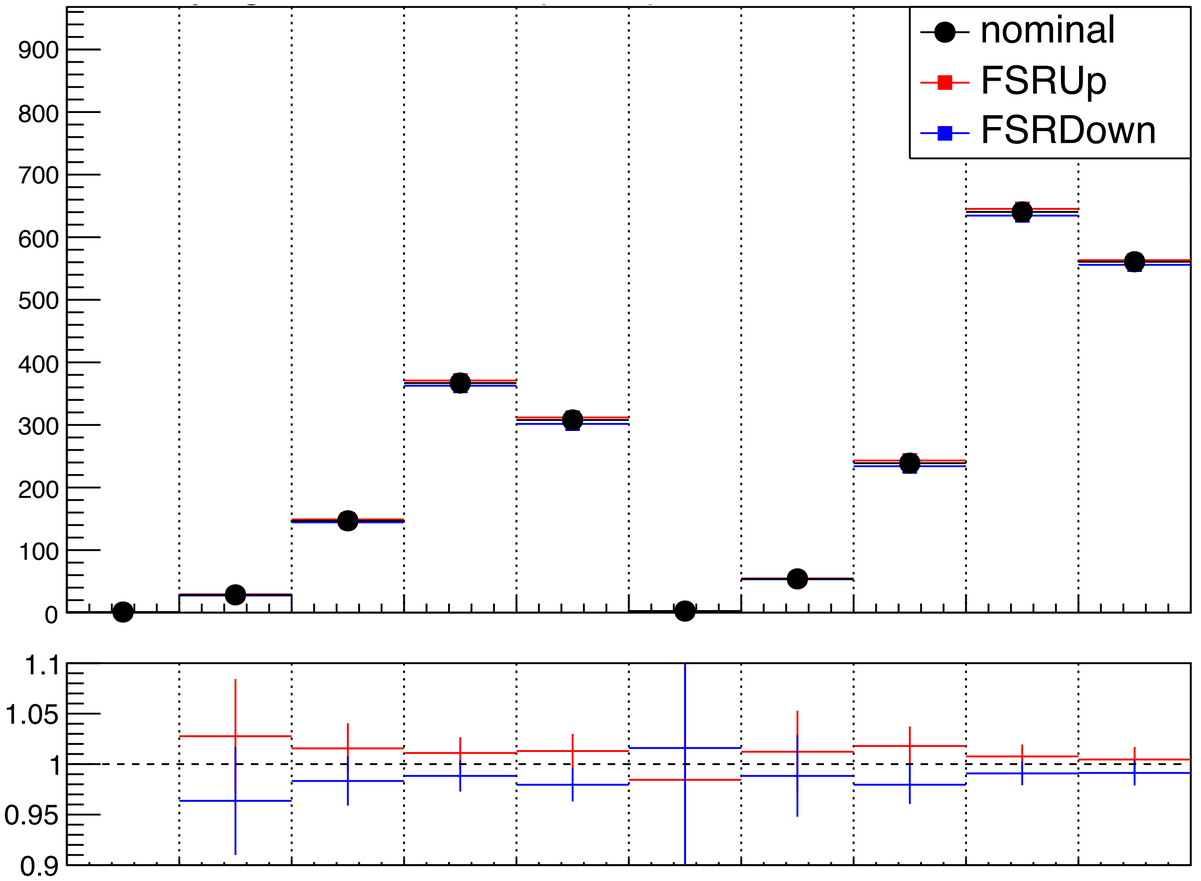


FSR up/down distributions

2016post_electron



2016post_electron



FSR up/down distributions

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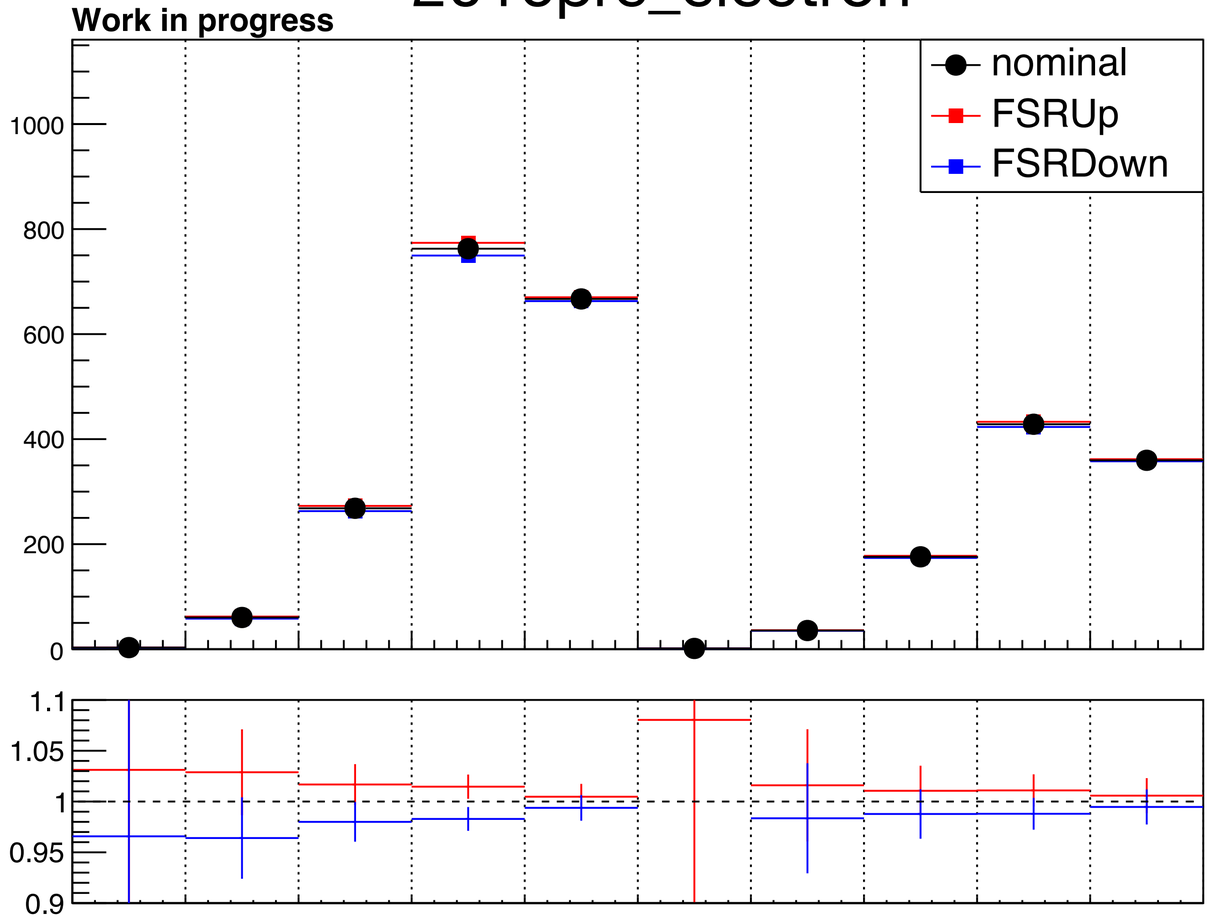

2016pre_electron