hdamp and psq2 systematics investigation

CMS Naples Meeting

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INFN Sezione di Napoli

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Fit instability

Problems

Situation in the fit procedure when the **hdamp** and **psq2** systematics are introduced:

- Large instability of the fit procedure
- Uncertainties of the final remain small after the introduction of these new systematics
- Fit more stable if only the normalization uncertainties are considered for these systematics

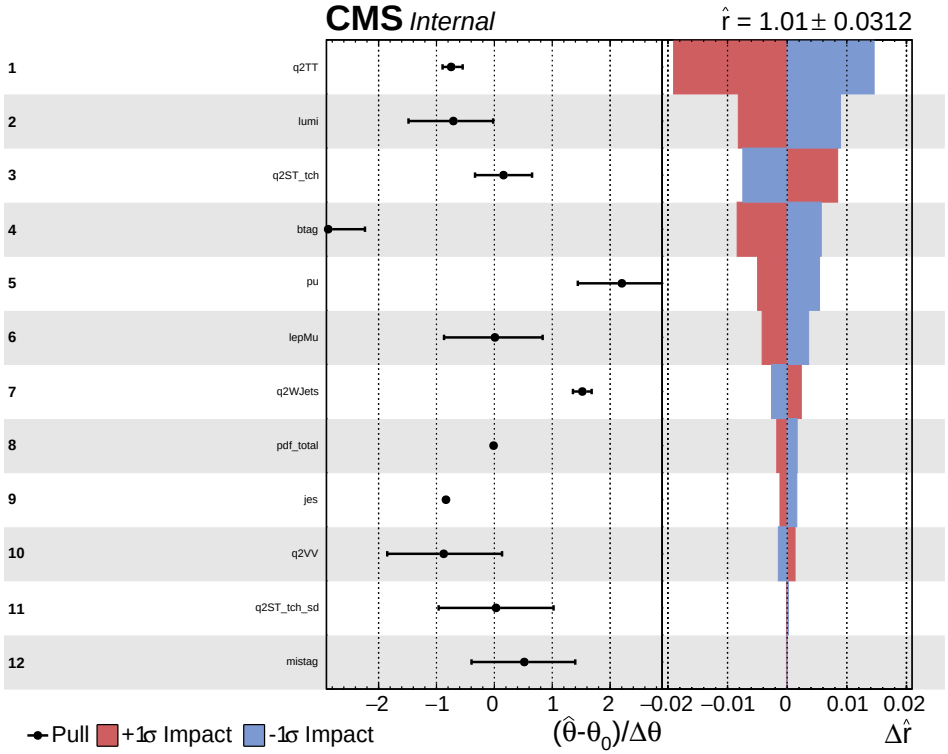
Where the problems could be

- Shapes of the hdamp and psq2 systematics (not tuned on the single top t-channel)
- Bad reproduced variables

Fit results and systematics impacts

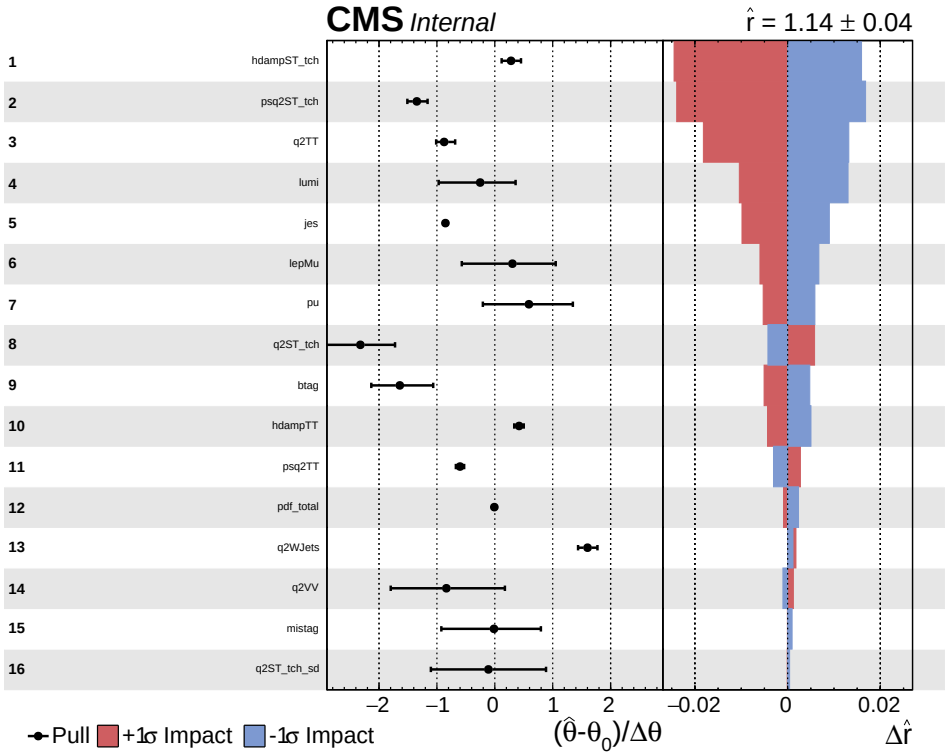
Fit without hdamp and psq2

Best fit r: 1.01 ± 0.03 (68% CL)



Fit with hdamp and psq2

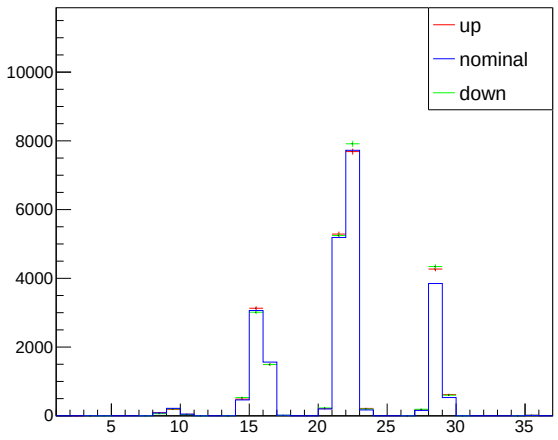
Best fit r: $1.14^{+0.03}_{-0.05}$ (68% CL)



hdamp t-channel input plots

2-jets–1-tag

h1D_2j1t_cr_3838



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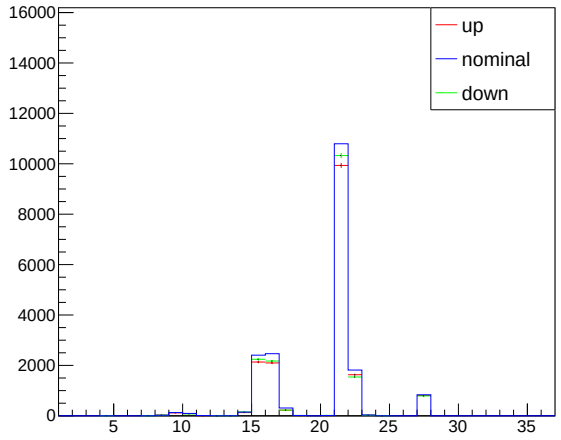
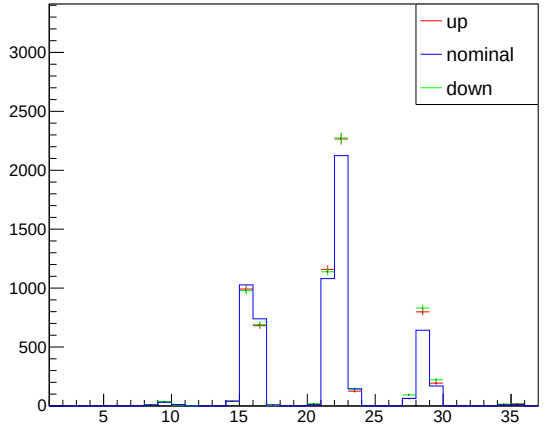
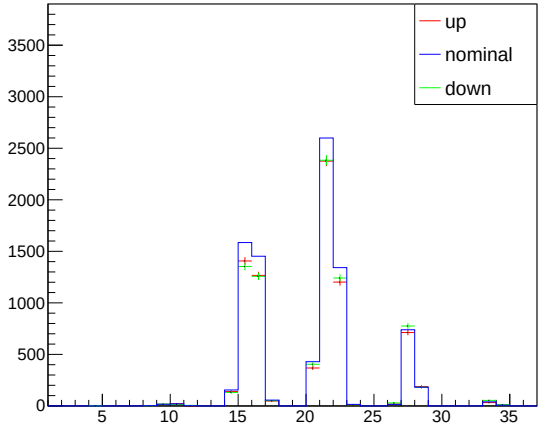


3-jets–1-tag

h1D_3j1t_cr_3838

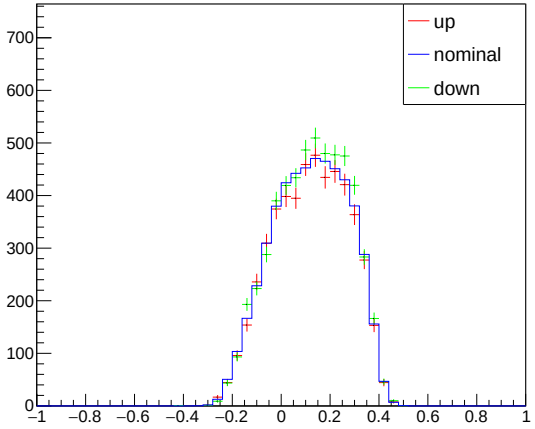


h1D_3j1t_sr_3838



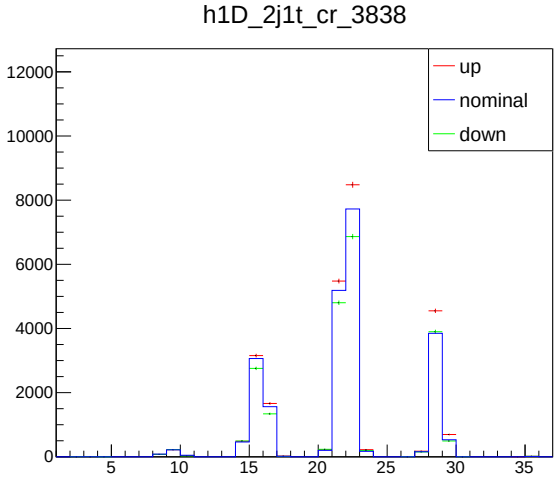
3-jets–2-tags

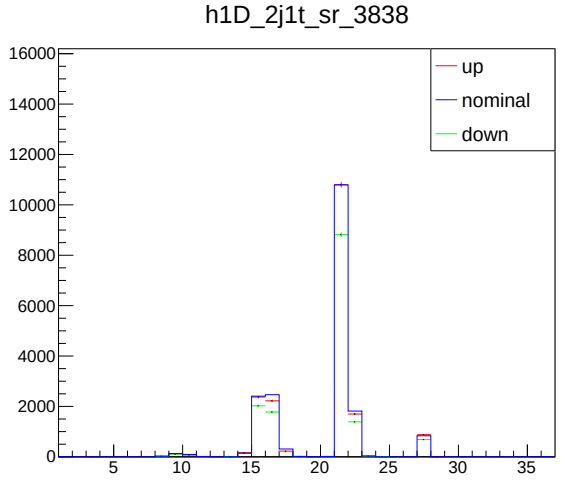
h_3j2t_BDT_ST_vs_TT_3j2t



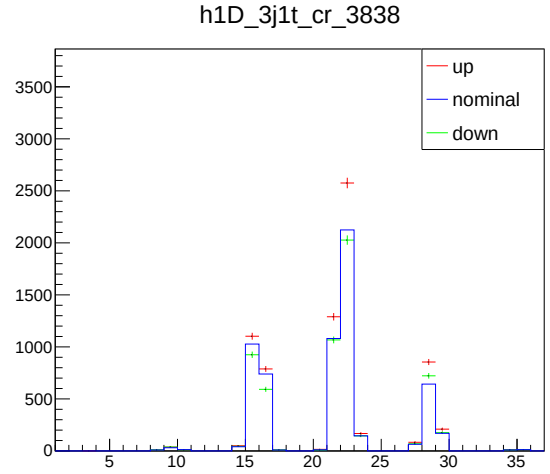
psq2 *t*-channel input plots

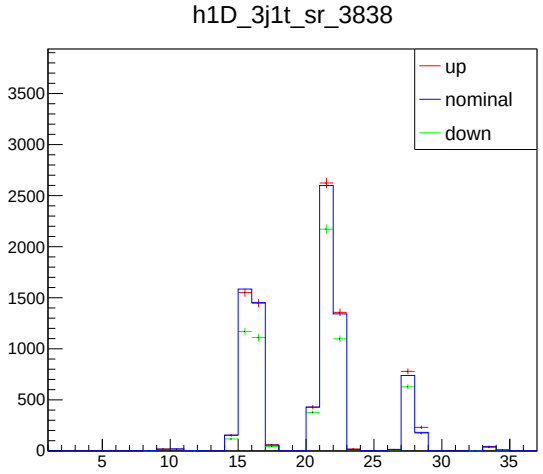
2-jets–1-tag



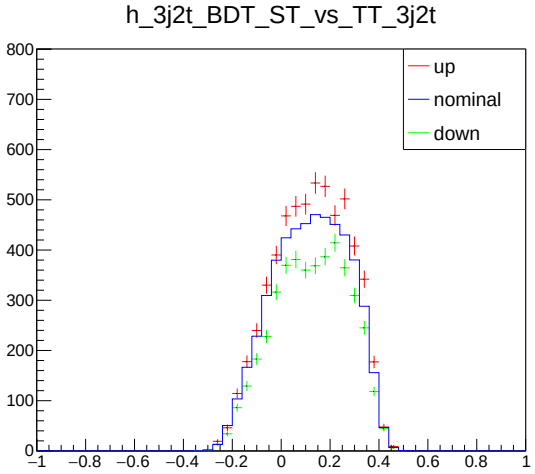


3-jets–1-tag



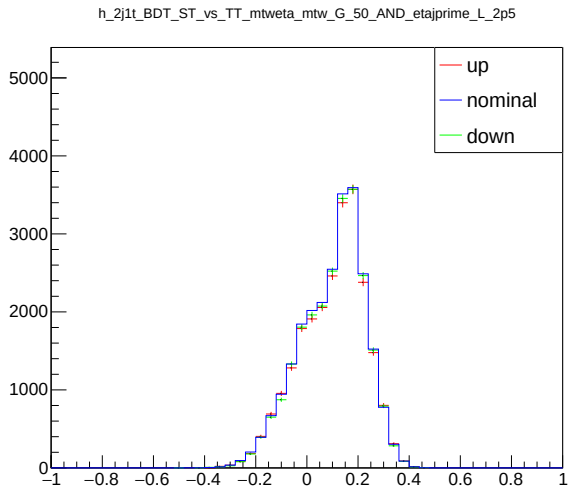


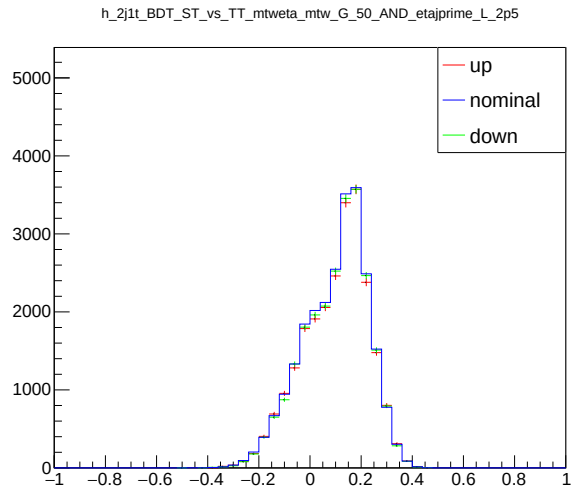
3-jets–2-tags



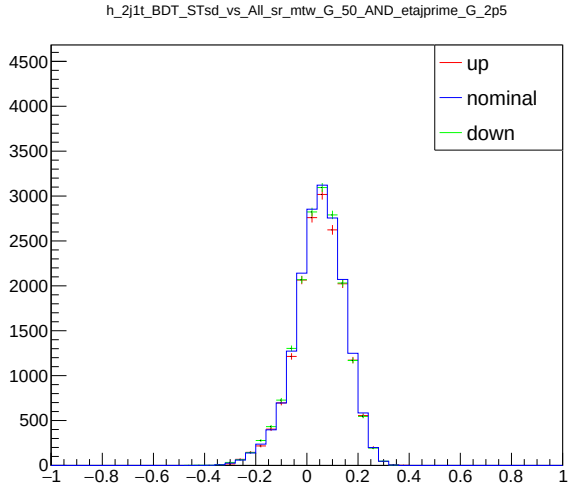
Discriminators for the t-channel (2j1t)

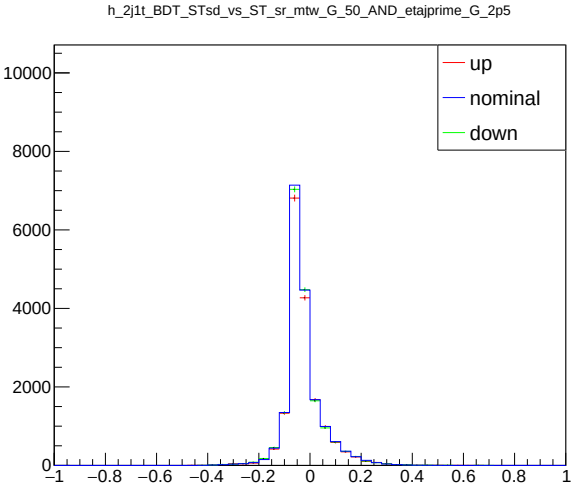
2-jets–1-tag central region





2-jets–1-tag signal region

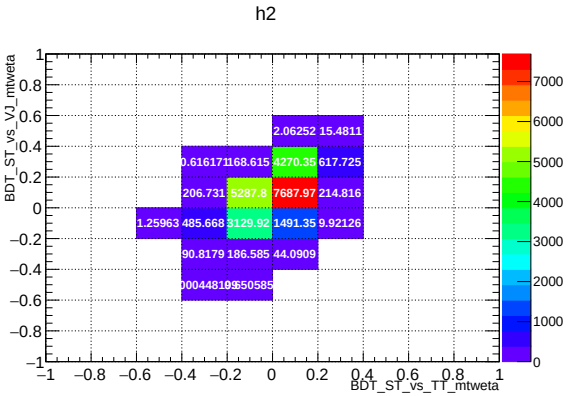




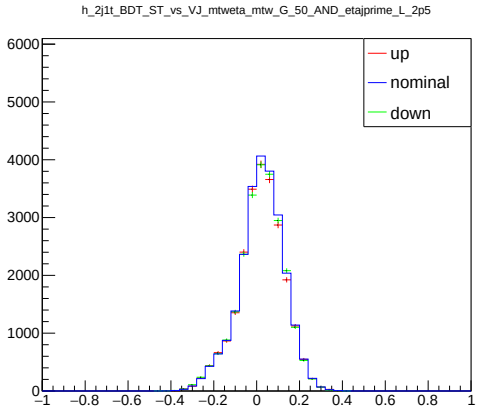
Unrolling procedure: 2-jets–1-tag central region

10% difference between up(and down) and nominal samples not visible in the simple 1D plots

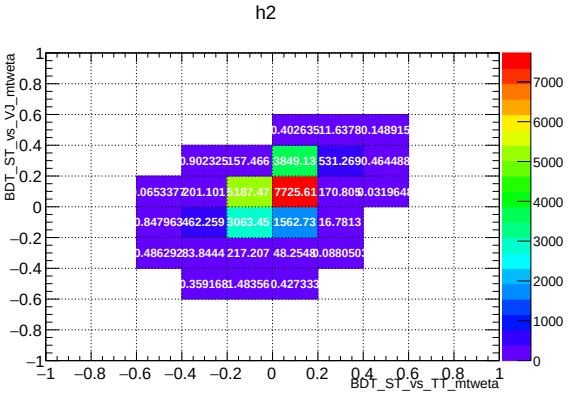
hdamp up



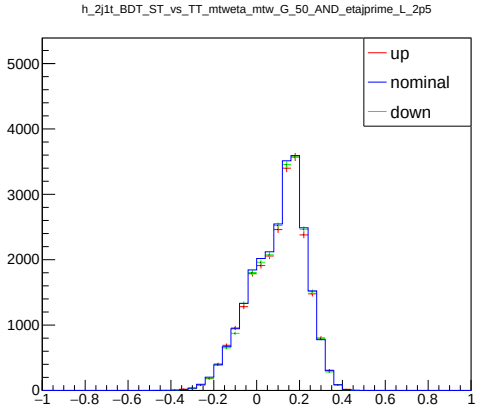
BDT x-axis



nominal



BDT y-axis



Conclusions

Current state of art:

- The fit seems to be stable without the hdamp and psq2 systematics
- hdamp and psq2 systematics treatment still problematic!

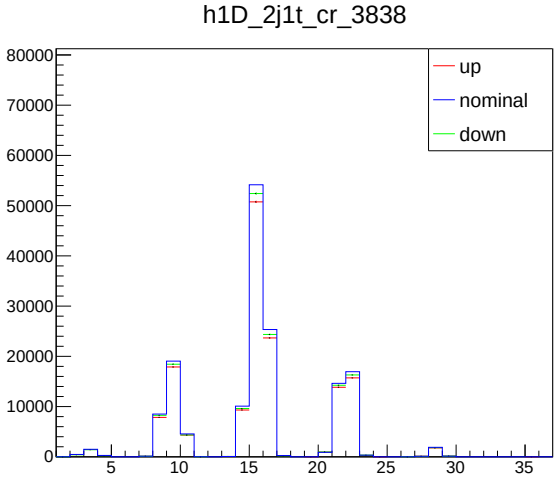
Near future plan:

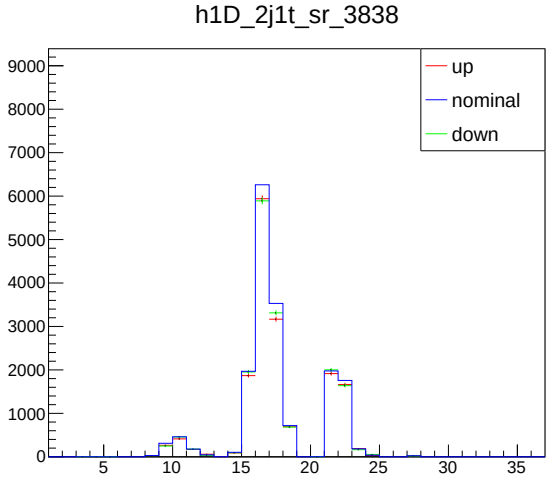
- Further investigation on the shapes of the distributions of the hdamp and psq2 samples
- Entire chain of the analysis will be soon re-checked to assure the absence of bugs

Backup

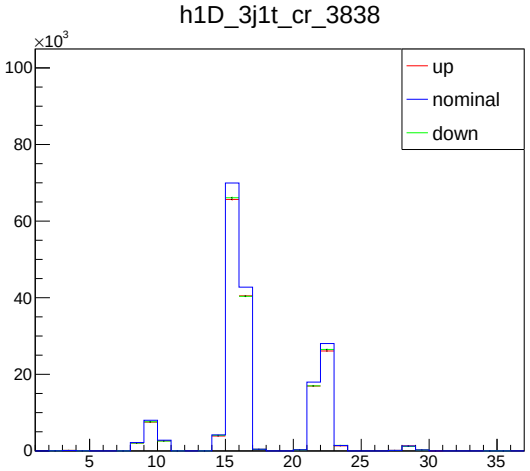
hdamp $t\bar{t}$ input plots

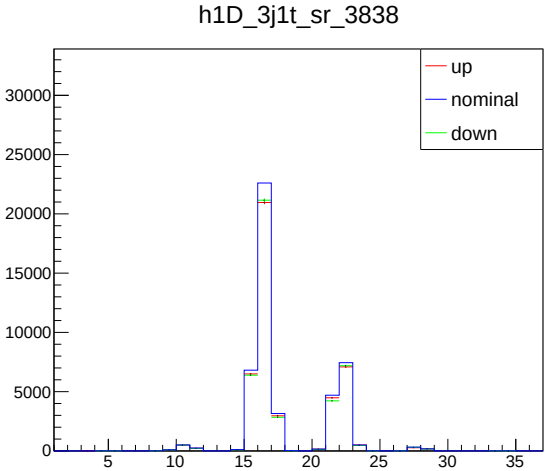
2-jets–1-tag



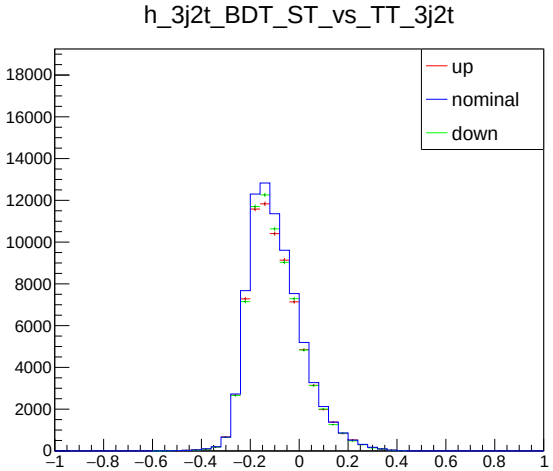


3-jets–1-tag



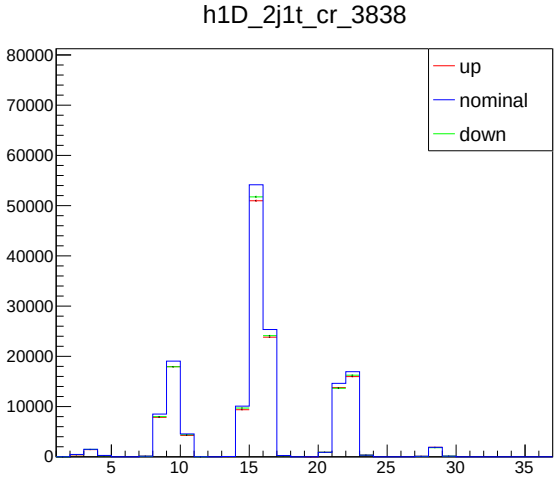


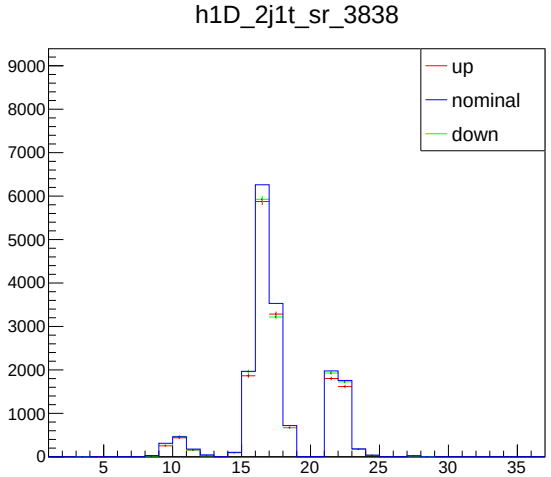
3-jets–2-tags



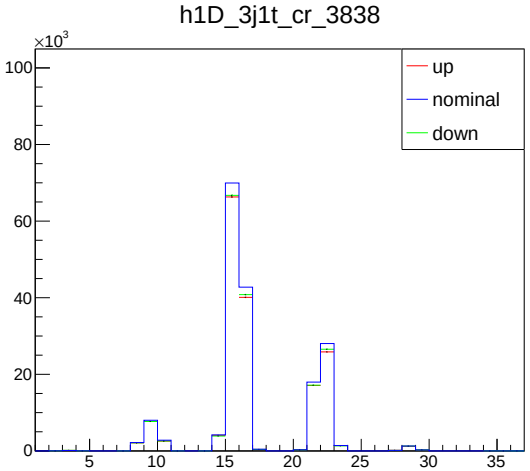
psq2 $t\bar{t}$ input plots

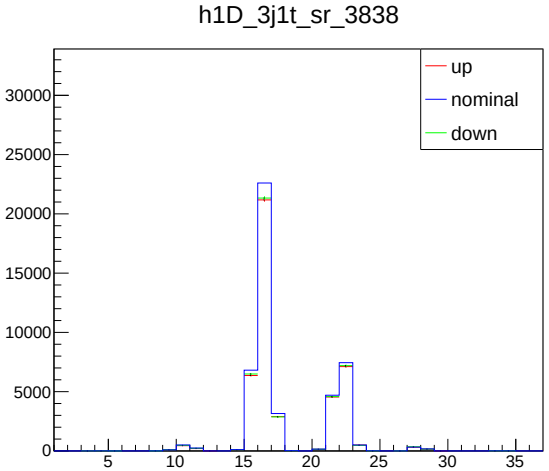
2-jets–1-tag



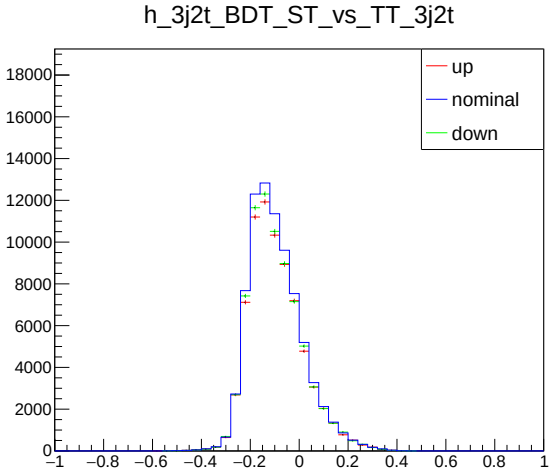


3-jets–1-tag



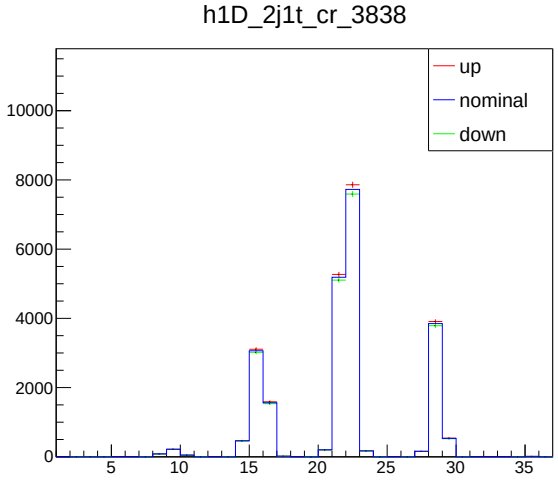


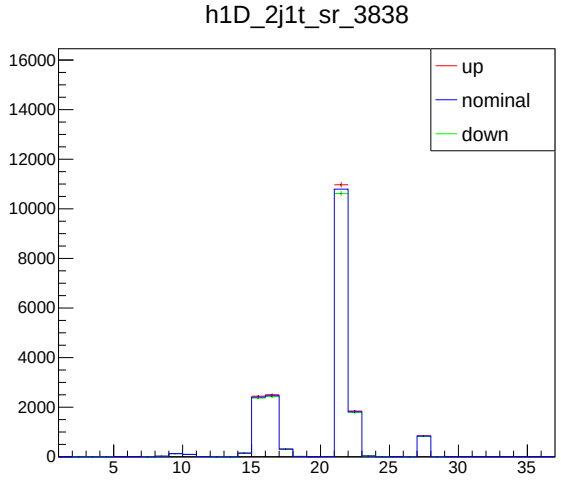
3-jets–2-tags



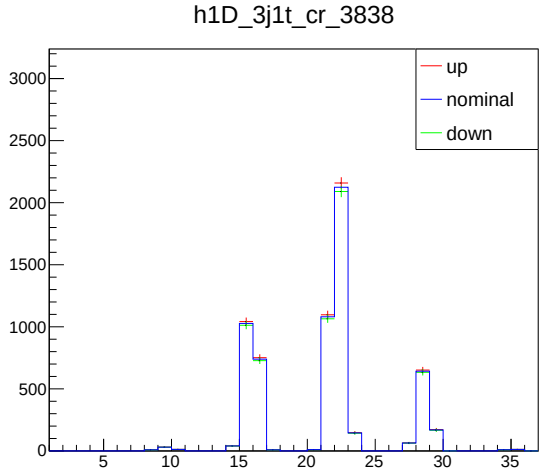
lep t-channel input plots

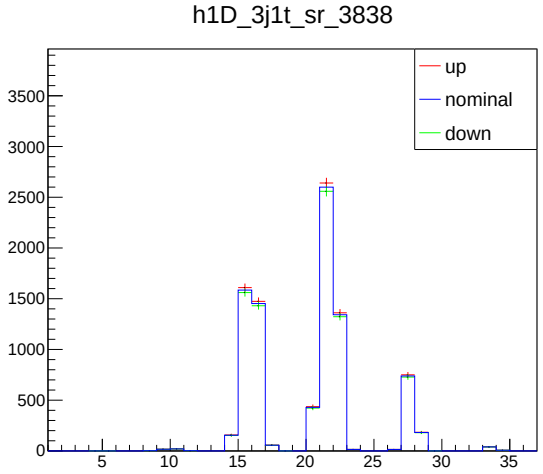
2-jets–1-tag



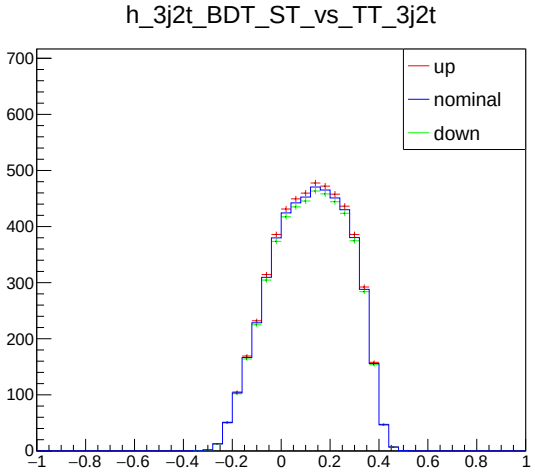


3-jets–1-tag



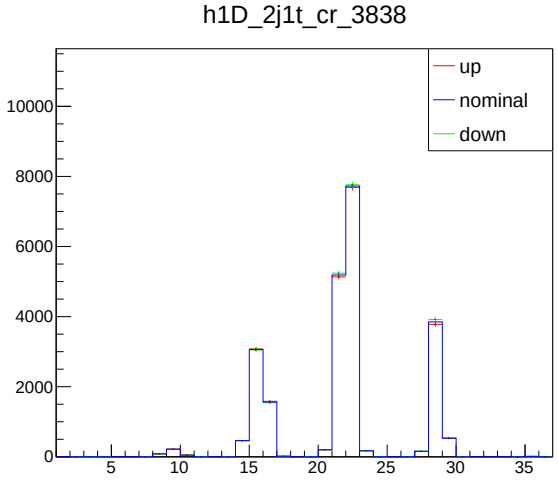


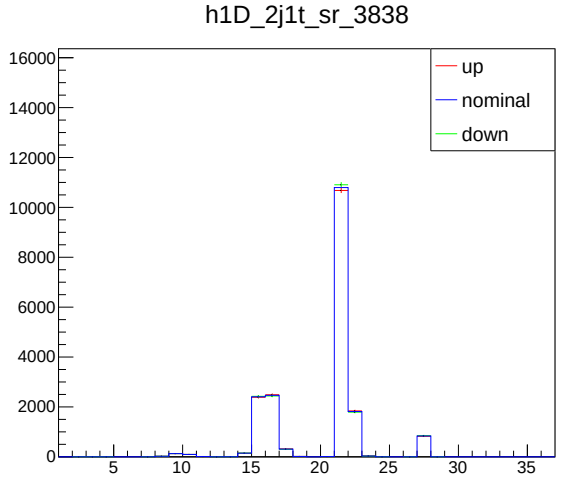
3-jets–2-tags



pileup t-channel input plots

2-jets–1-tag





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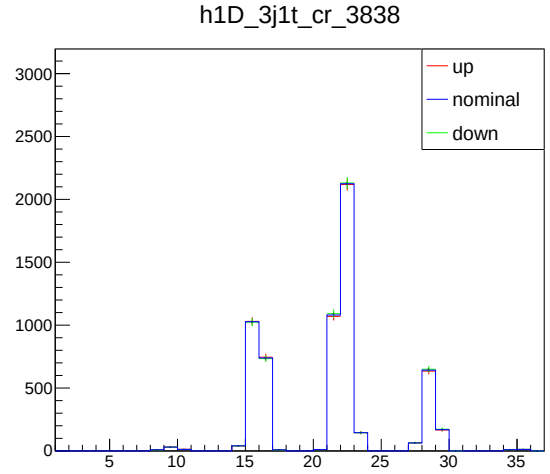

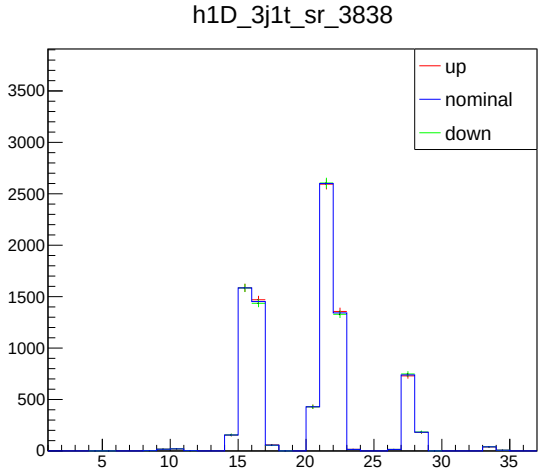

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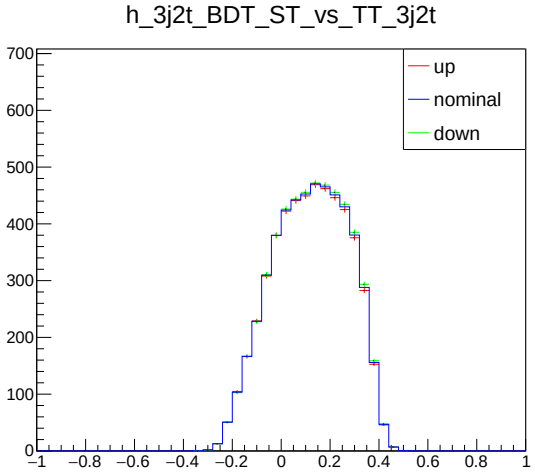
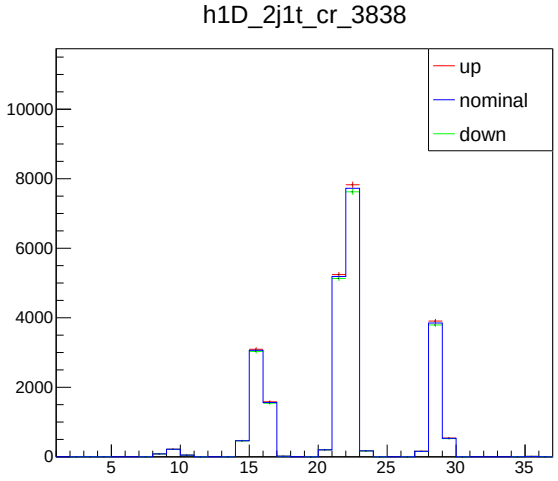
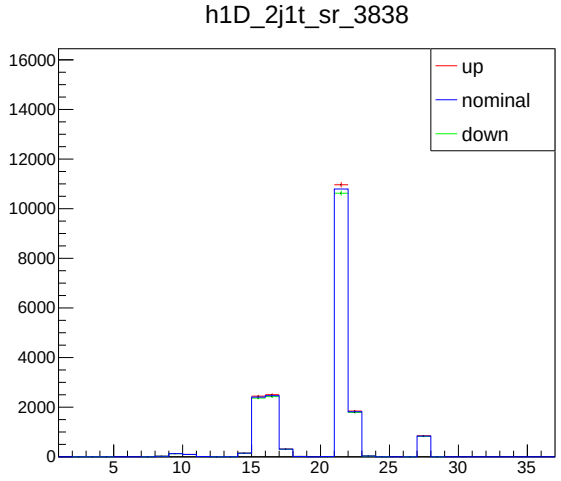


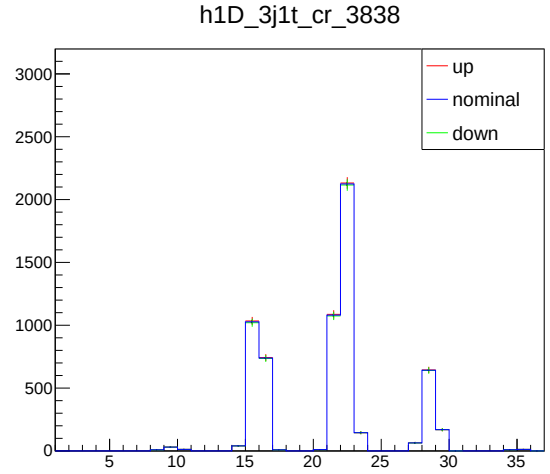
btag t-channel input plots

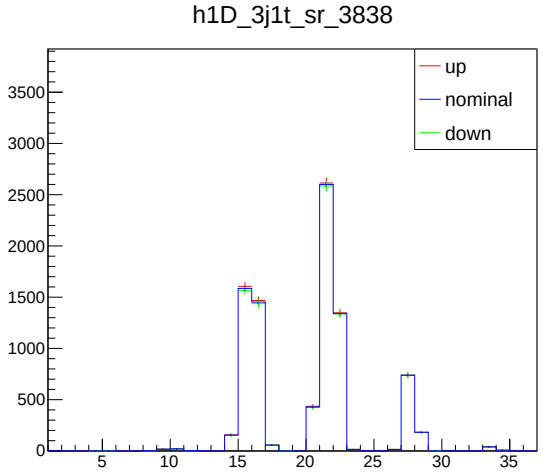
2-jets–1-tag



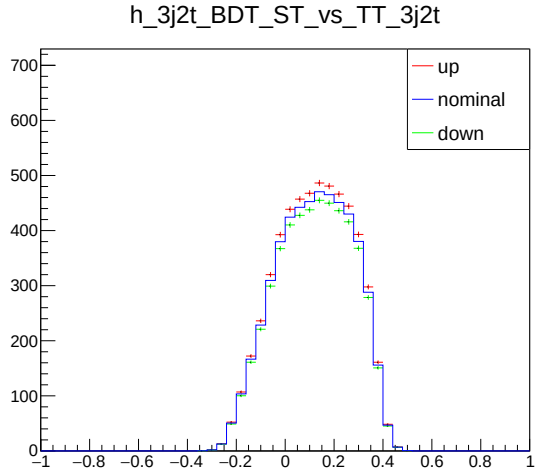


3-jets–1-tag



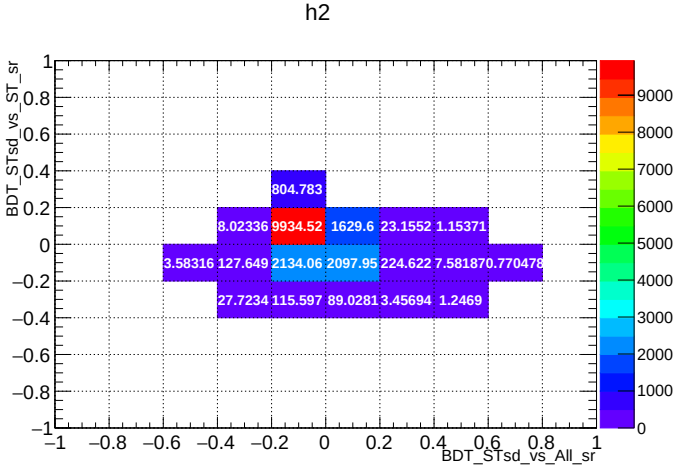


3-jets–2-tags

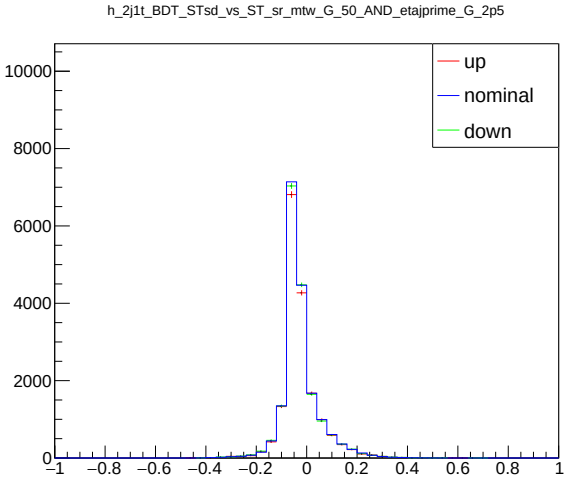


Unrolling procedure: 2-jets–1-tag signal region

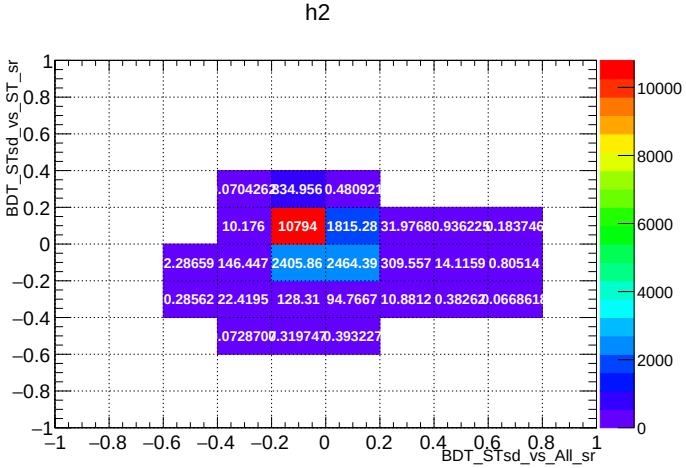
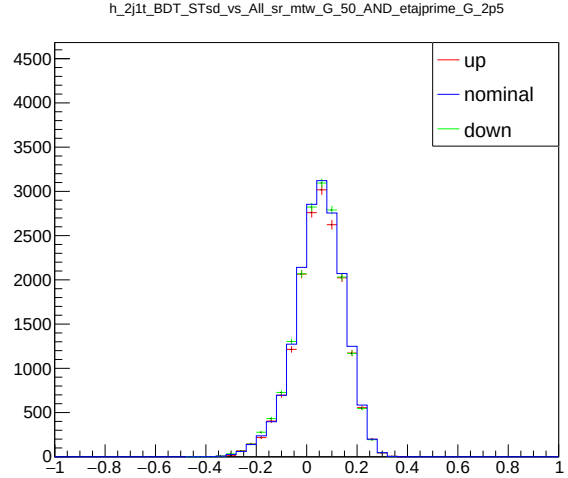
hdamp up



BDT x-axis



nominal



BDT y-axis