

# Single top cross section studies

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# Overview of (sub-)section

Altogether 5 pages are allotted for top cross section (tt, single top, 4-top)

The single top section will cover theory, a t-channel differential measurement (CMS), s-channel cross-sections (ATLAS) and tZq cross-sections (ATLAS)

- Theoretical issues will be separated from experiment and discussed in their own chapter
- Duplication of experimental details will be avoided by collecting common details into a single chapter

# Section outlines - theory

## Theory-inspired introduction

- Cross-sections and differential distributions for HE
- Tails of distribution at HL/HE, EW corrections?
- Channel separation ( $t, s, Wt$ ), potential issues with HL precision
- Modeling, 4FNS/5FNS, NNLOPS...
- Top reconstruction, final state observables (maybe common to most top analyses, can be moved?)
- $tZ$ : cross section for HE
- EFT interpretation for  $tZ$
- 4-8 plots?

# Section outlines - experiment

## Common analysis techniques

- MVA, unfolding (iterative bayesian & TUnfold) (maybe common to most top analyses?)
- Top quark reconstruction reco-level (t-channel/tZq)
- No plots planned for this section

# Section outlines - experiment

Measurement of t-channel differential xsec (top quark  $p_T$  & polarization angle)  
(only HL-LHC)

- Assess sensitivity of top quark  $p_T$  spectrum on differences in 4/5FS modeling & high  $p_T$  tail
- Assess sensitivity of polarization angle on  $Wtb$  couplings, reference connection to EFT
- Assess sensitivity of top rapidity on PDF
- 3 plots in total

# Section outlines - experiment

## Measurement of s-channel xsec

- s-channel analysis overview- event selection, MVA details, unfolding
- Sensitivity to anomalous couplings/EFT observables of mass spectrum
- HL-LHC analysis
  - Results of inclusive, differential cross-sections (differential variables under discussion)
- HE-LHC analysis
  - High- $q^2$  analysis, results and limits on  $Wtb$  couplings
- 1-2 plots

# Section outlines - experiment

Measurement of  $tZq$  xsec (most probably only HL-LHC)

- Result for inclusive cross-section measurement (binned likelihood fit of a NN discriminant)
- Differential cross-sections (variables under discussion)
- 1-2 plots

# Timeline

Our working group will meet again in ~2 weeks to discuss progress

Hope to have early/preliminary draft plots in time for June plenary meeting