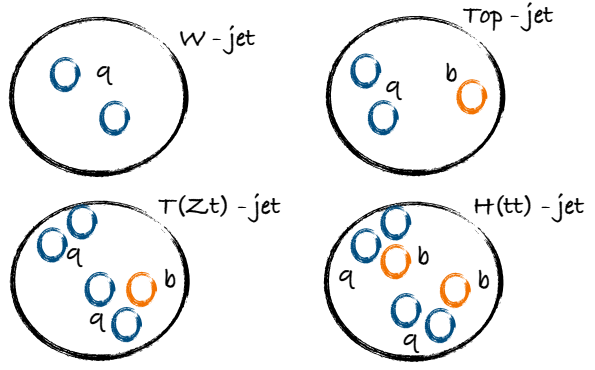


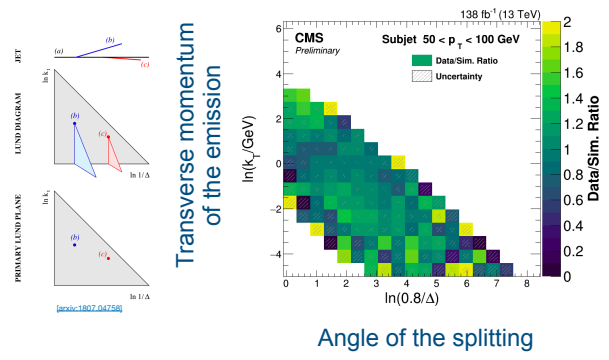
Why do we need Lund Plane Reweighting?

- Searches for physics beyond the SM can contain jets with more than three energy prongs ($T \rightarrow tZ \rightarrow 5q$, $H \rightarrow t\bar{t} \rightarrow 6q$)
- Typically, the calibration is performed with SM candles like W or top quarks from $t\bar{t}$ production \rightarrow it covers only up to three quark decays!



What is the primary Lund Jet Plane?

- Lund Jet Plane (LJP):** a 2D representation of the density of splittings inside the showering process of the jet
- 'primary' LJP:** it includes the splittings along the hardest branch of the clustering history
- LJR reweighting map:** the ratio between data and simulation of quark jets from W decays in bins of p_T

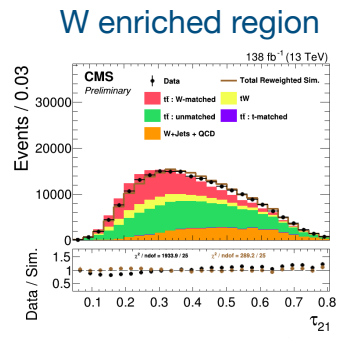


Lund Plane Reweighting for Jet Substructure Correction at CMS

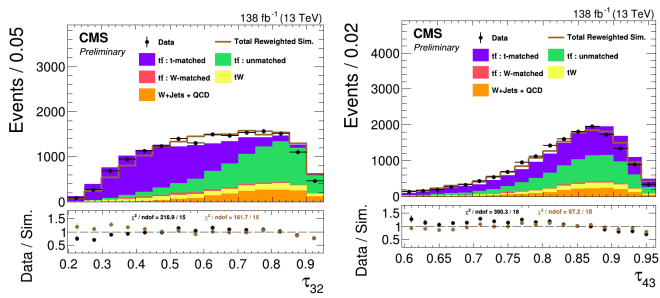
Or how to correct jets with more than 3 energy prongs?

W and top jets substructure observables in semi-leptonic tt

- Corrections are derived on $W \rightarrow q\bar{q}$ (2 prong)
- To validate jets with higher number of prongs it is applied to top (3 prong)
- Data-to-simulation agreement improves for W and top jets **after applying the correction!**

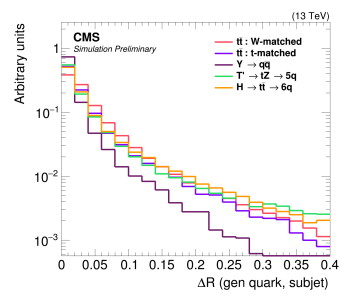


W enriched region



Top enriched region

Systematic uncertainty

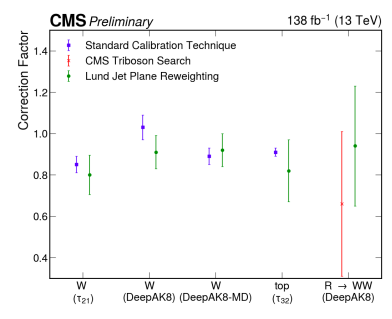


Systematic uncertainties

- Ratio uncertainty
- p_T extrapolation
- B jet uncertainty
- Matching uncertainty (dominant)

Comparison of the correction

- Method is very general
- Large error, but remains the only option for particular phase spaces



Anna Benecke

On behalf of the CMS Collaboration



Scan me for the DP note

