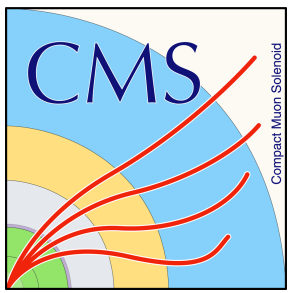
Exploring azimuthal correlations in multijets events

A. Bermudez Martinez

Short-term studentship project with
Leif, Torbjörn and Johannes

April, 2018

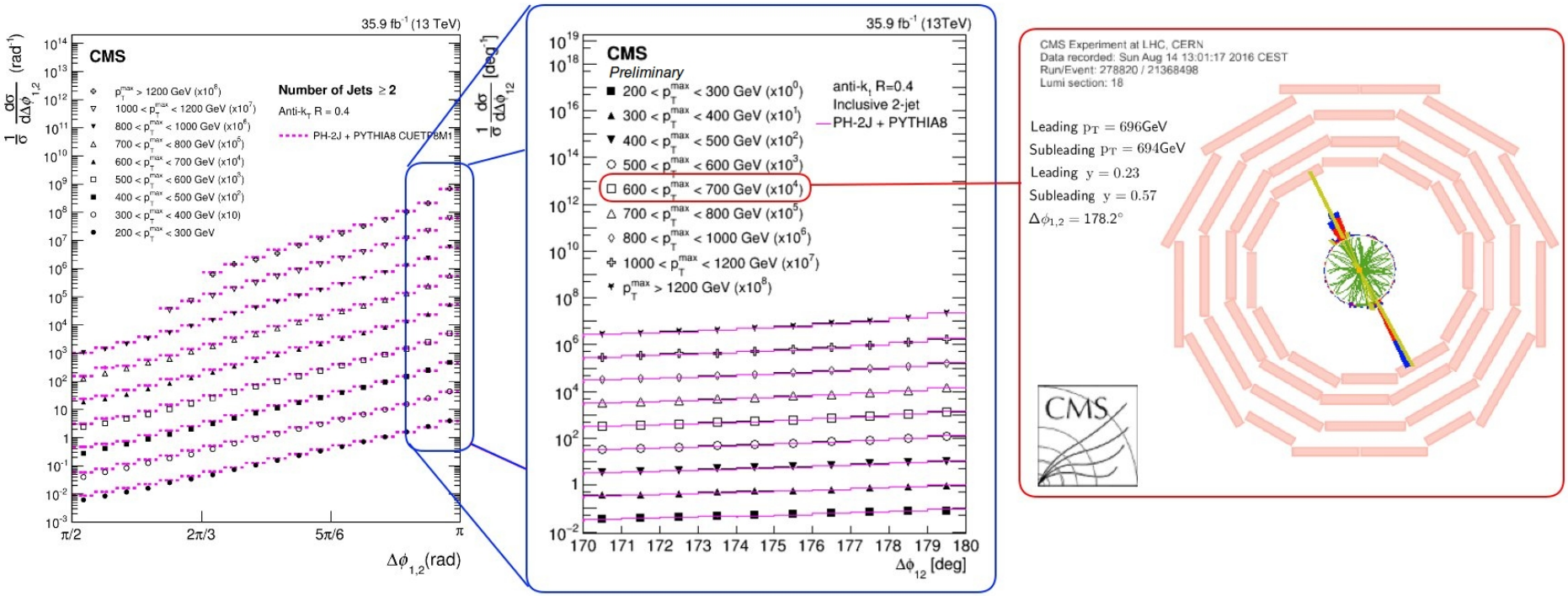


Outline

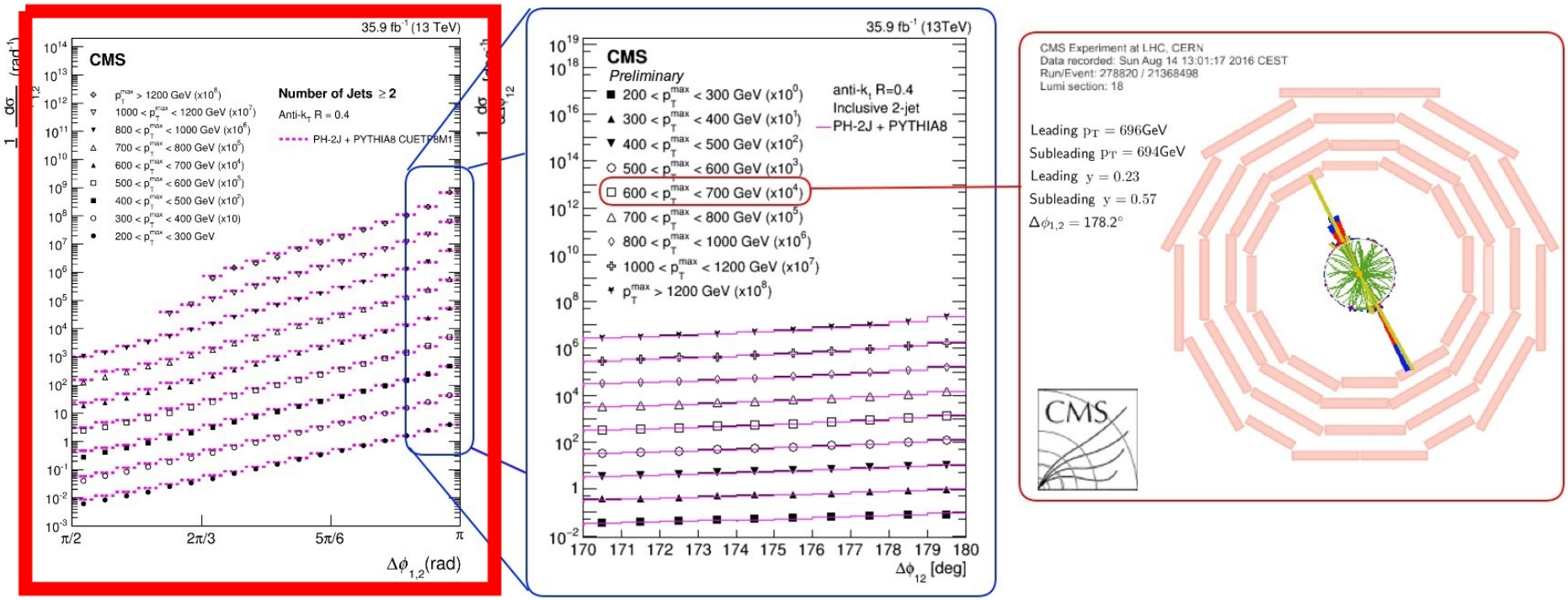
- Correlations in 2- and 3-jet events
- Correlations 4-jet events
- Outlook

Thank you.

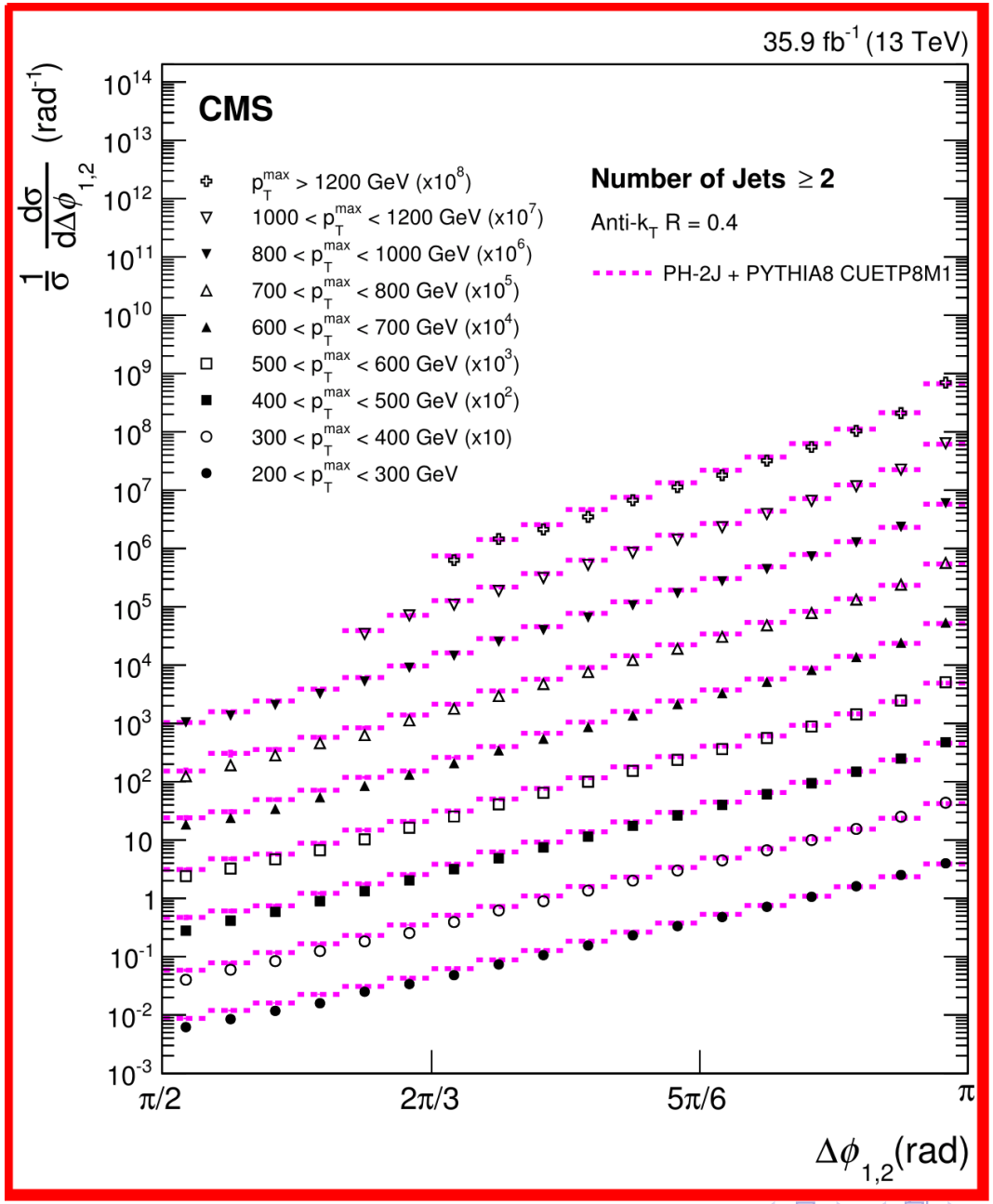
Azimuthal correlations in 2-jets events



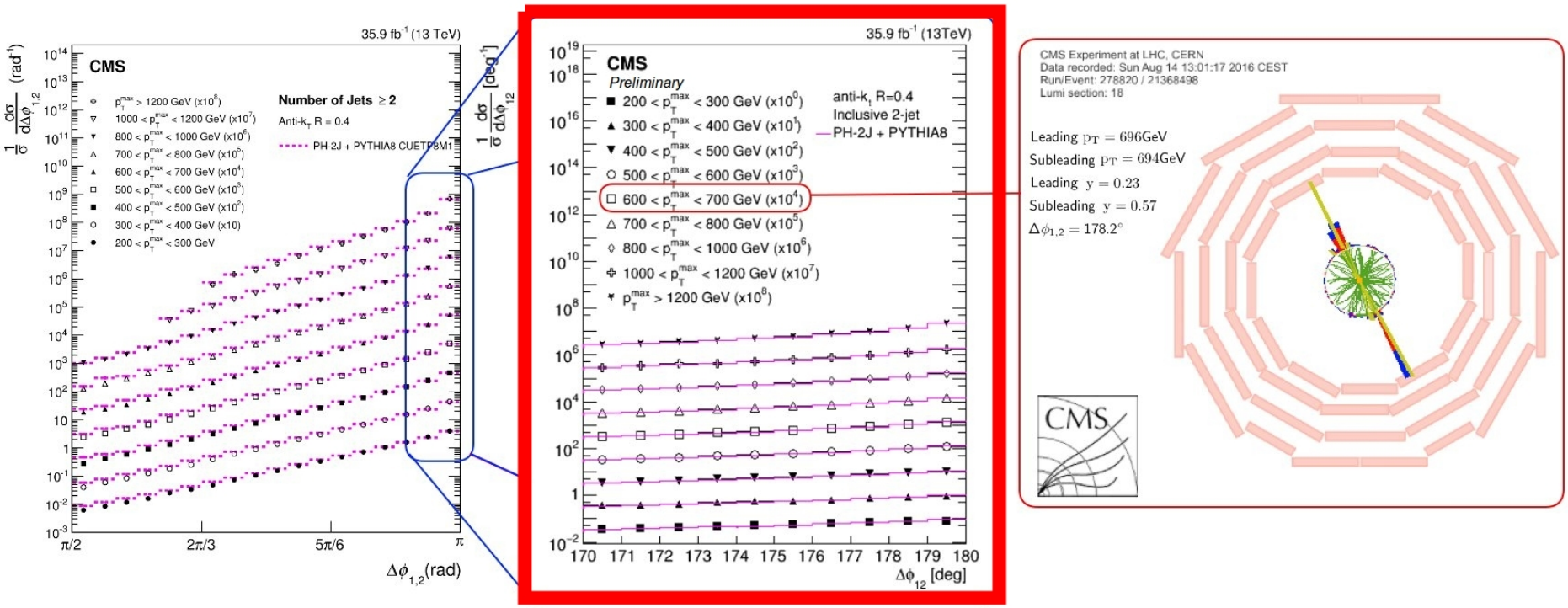
Azimuthal correlations in 2-jets events



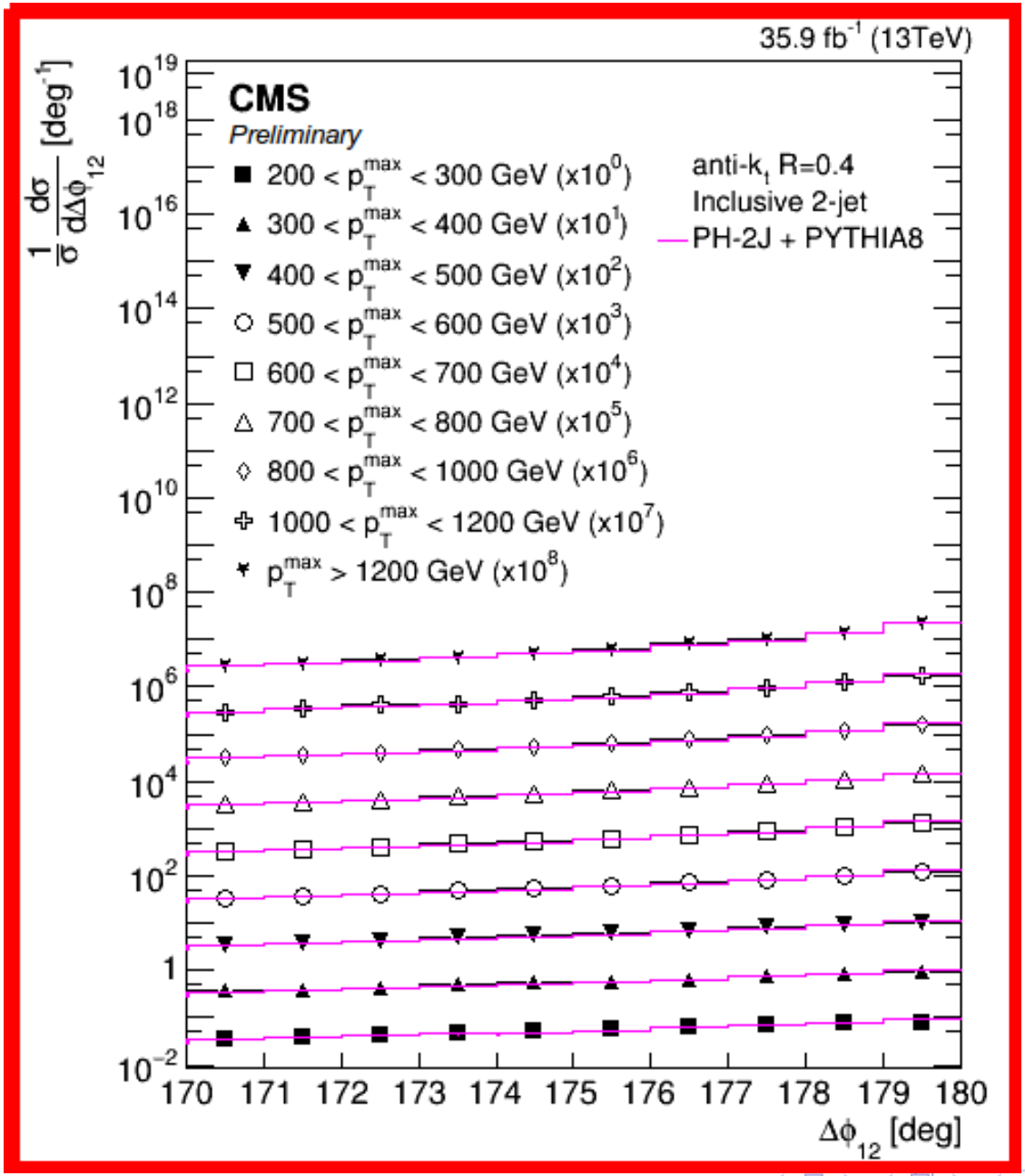
Azimuthal correlations in 2-jets events



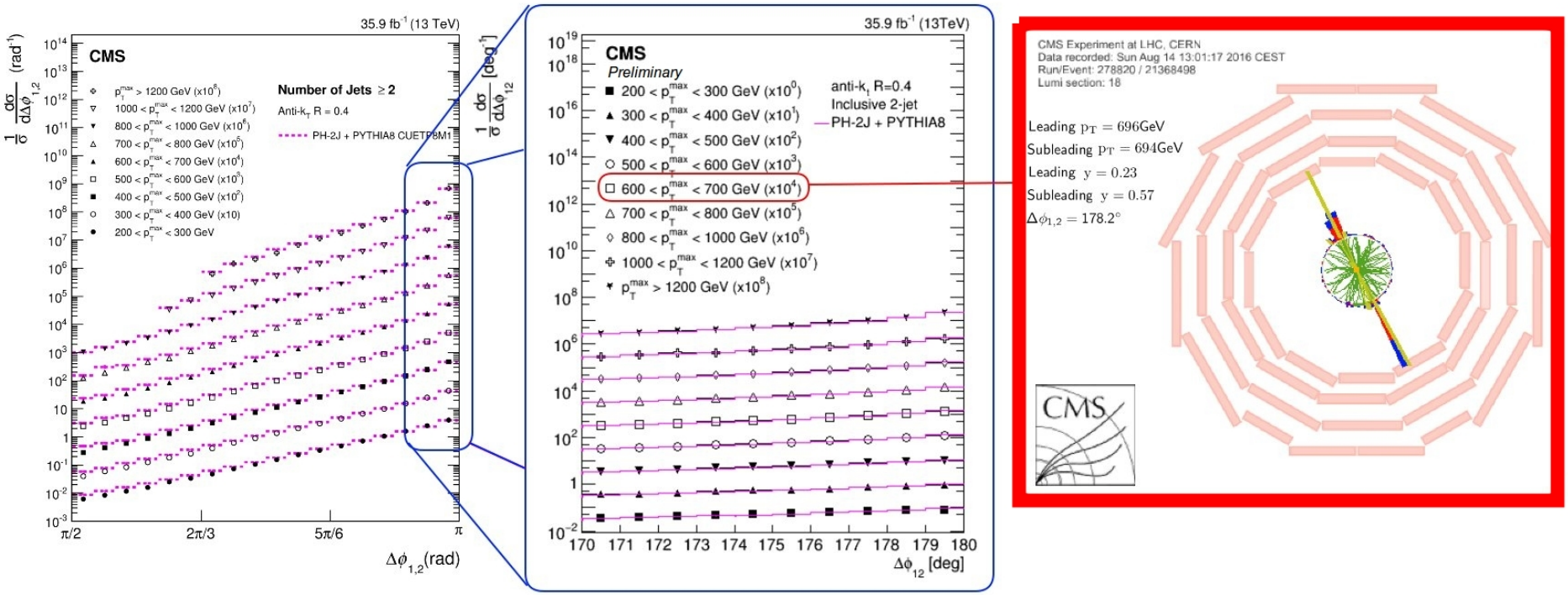
Azimuthal correlations in 2-jets events



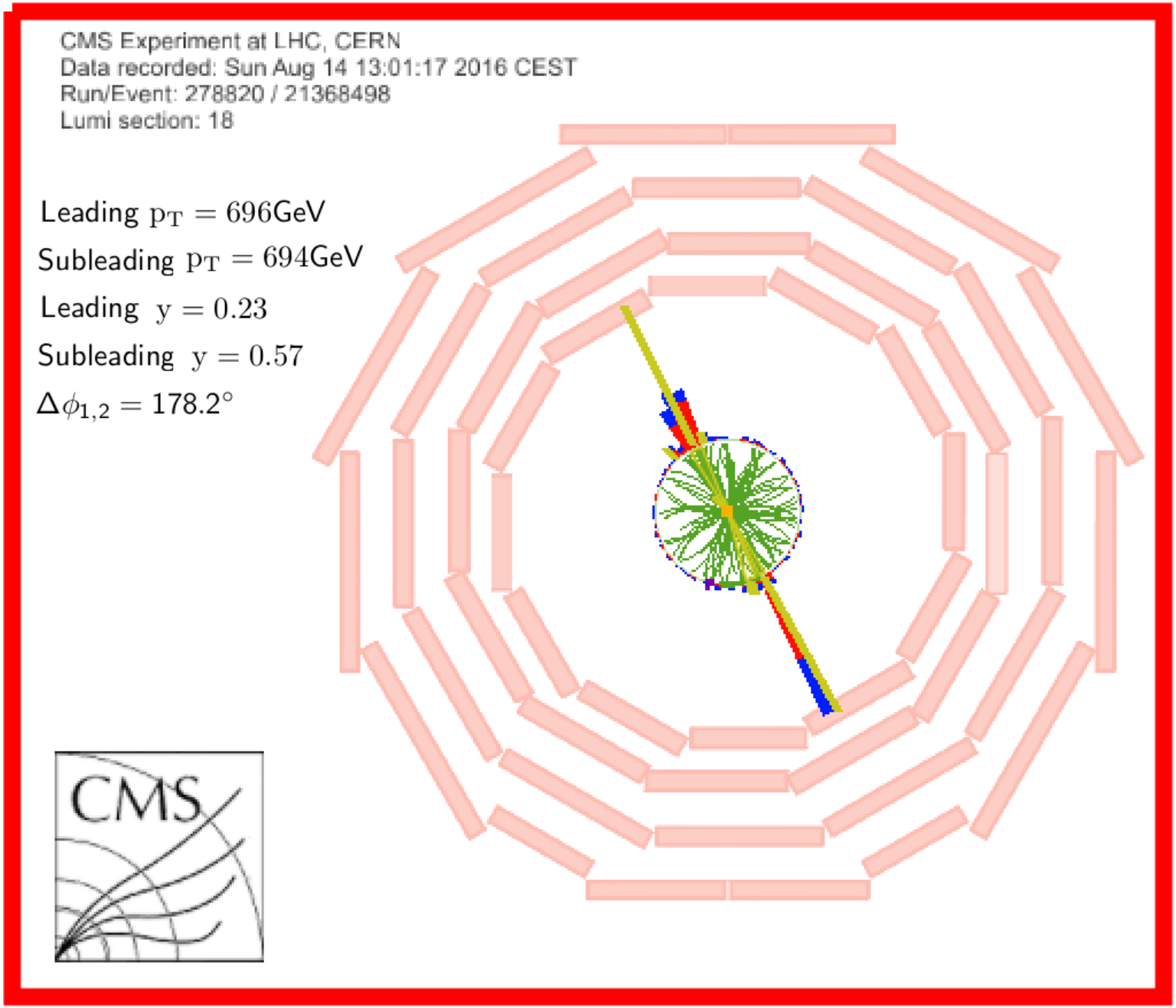
Azimuthal correlations in 2-jets events



Azimuthal correlations in 2-jets events

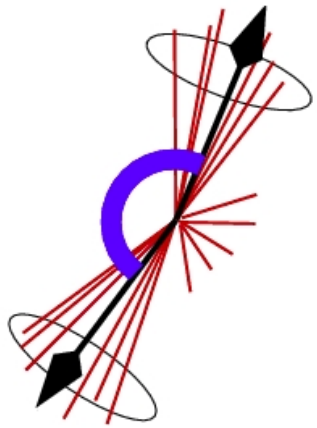


Azimuthal correlations in 2-jets events

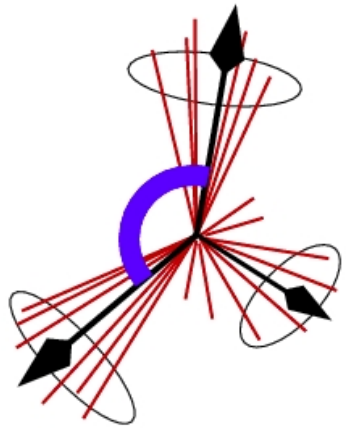


Azimuthal correlations in 2- and 3-jets events

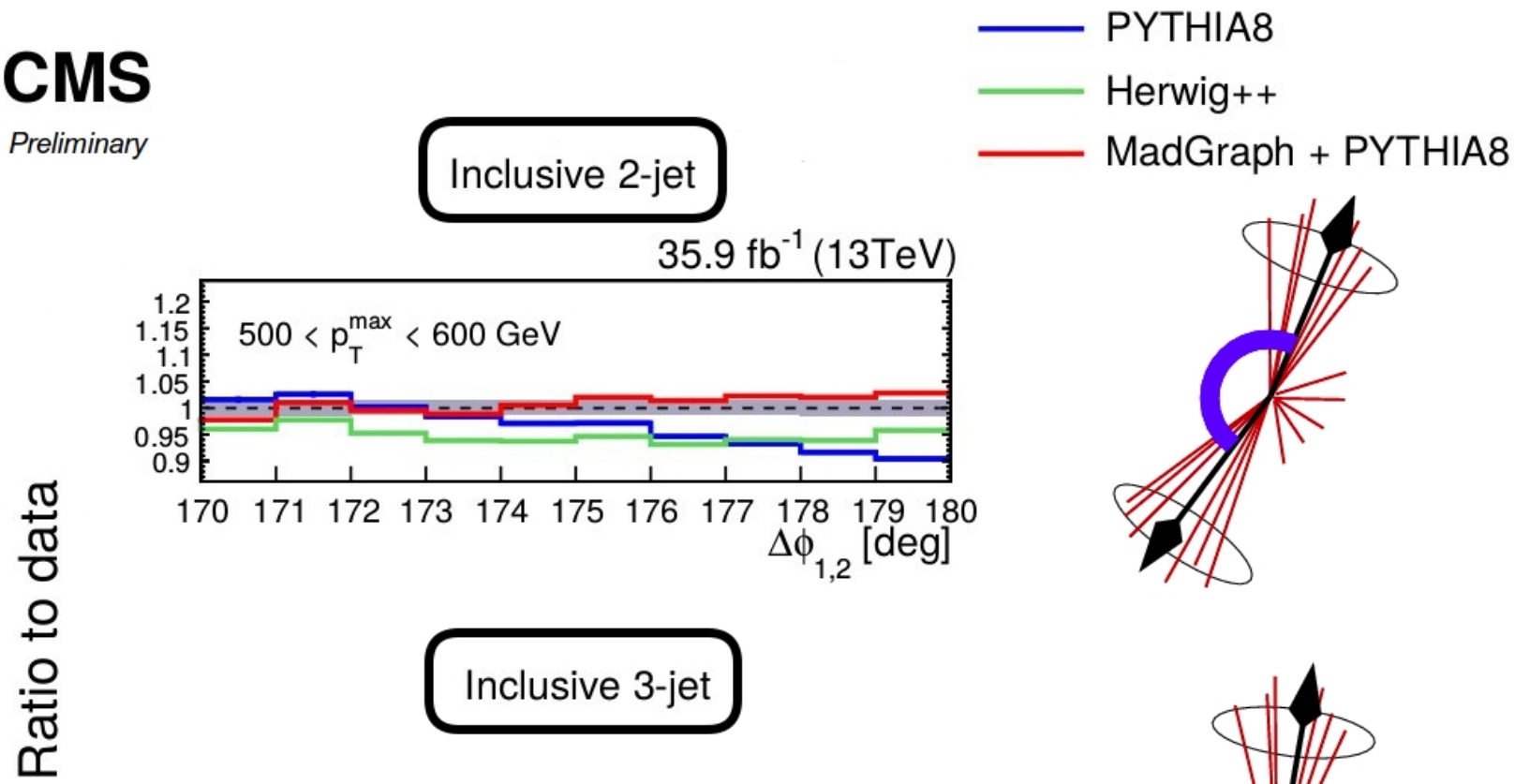
Inclusive 2-jet

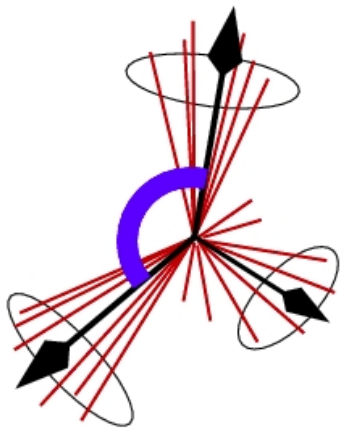


Inclusive 3-jet



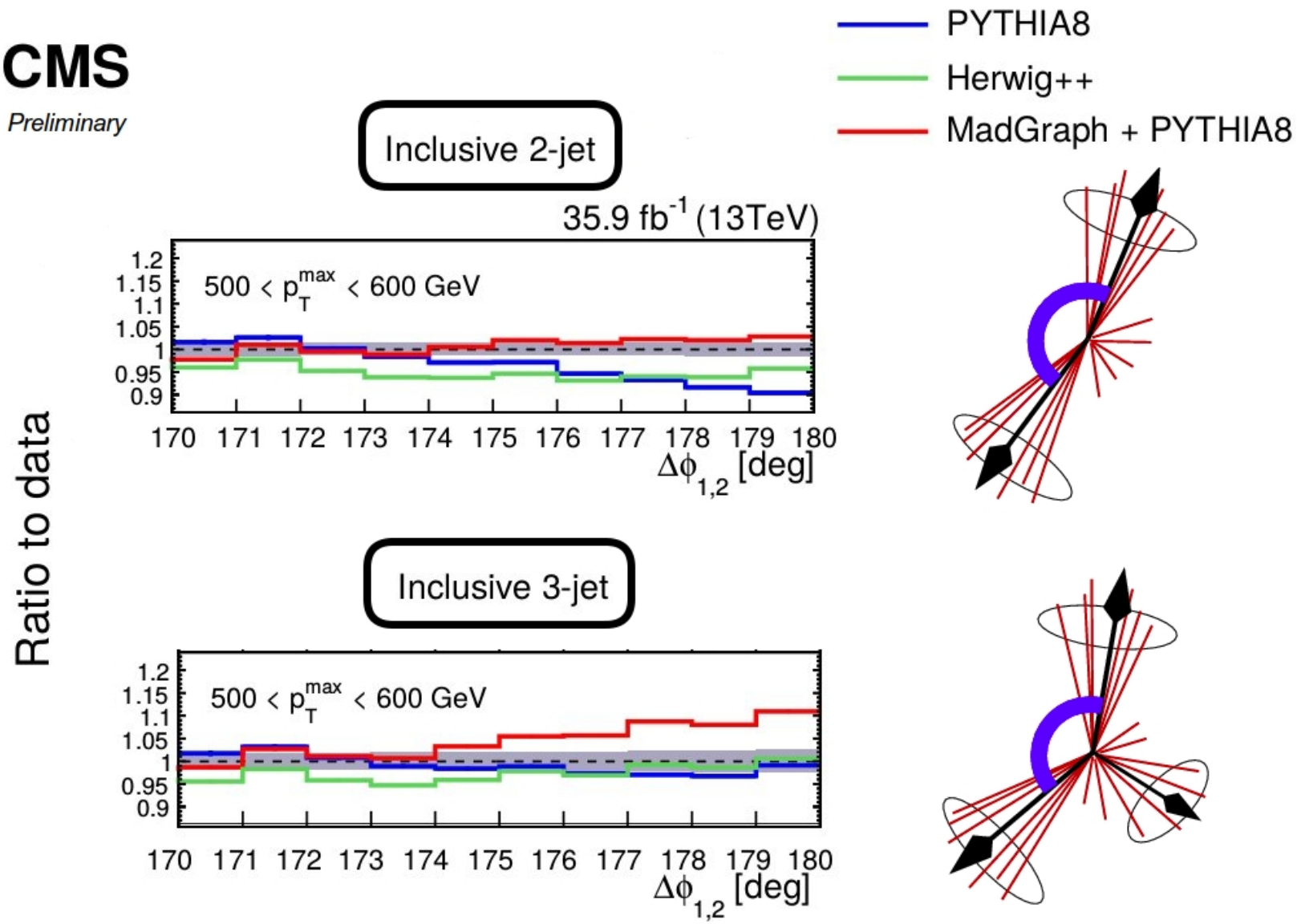
Azimuthal correlations in 2- and 3-jets events





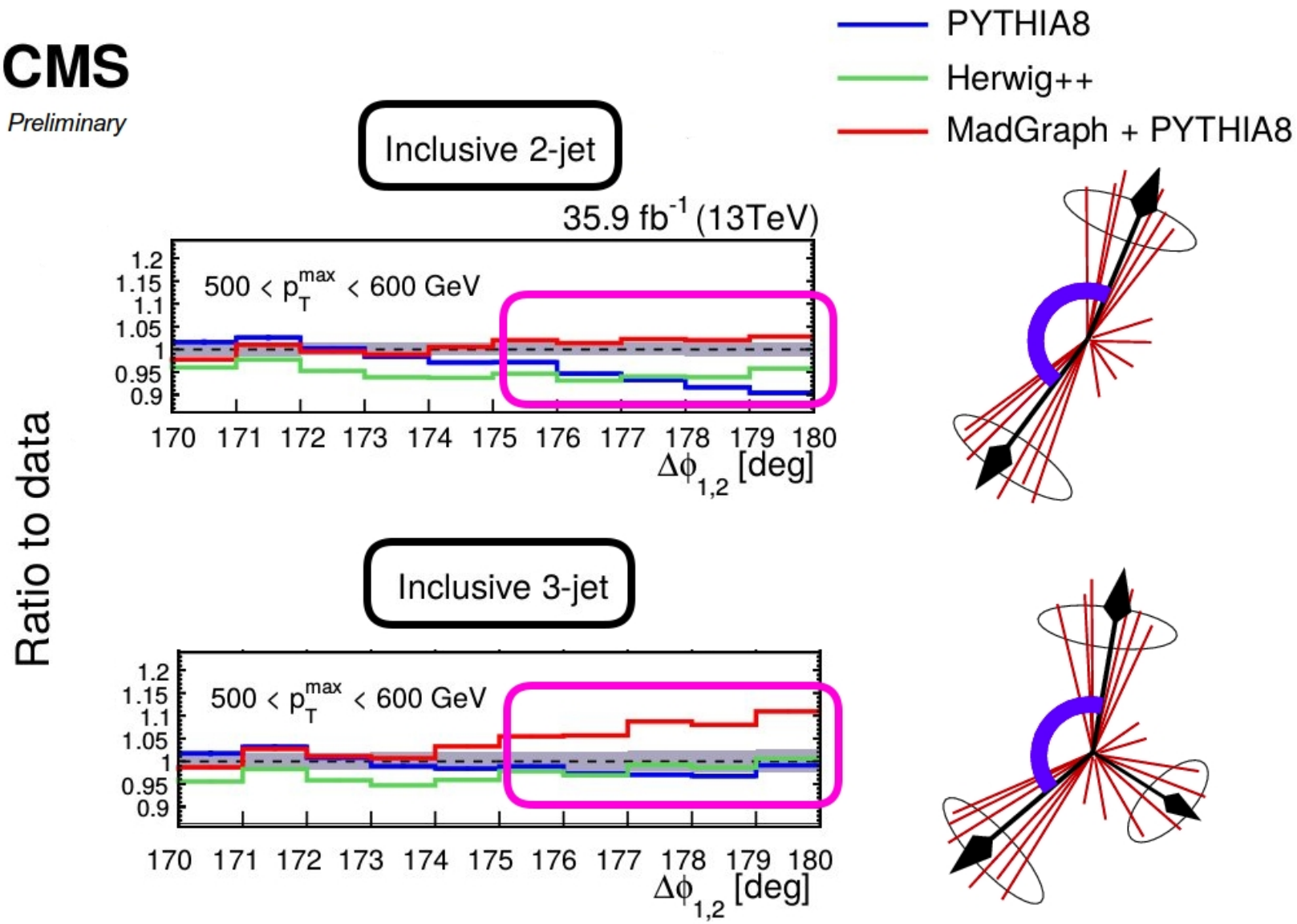
Azimuthal correlations in 2- and 3-jets events

- Tension between data and predictions ∼12%
- Counter intuitive performance
- Non of them is able to describe both simultaneously



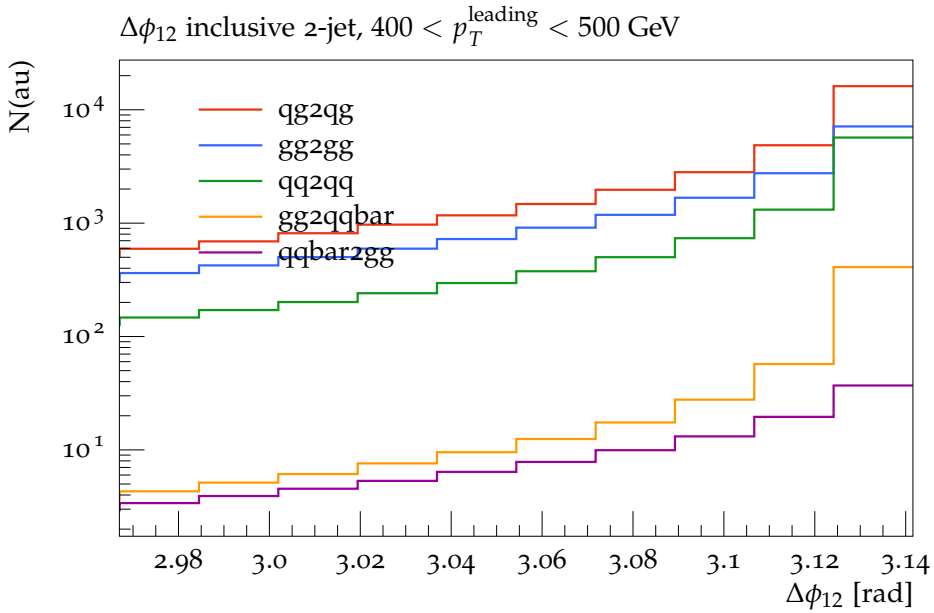
Azimuthal correlations in 2- and 3-jets events

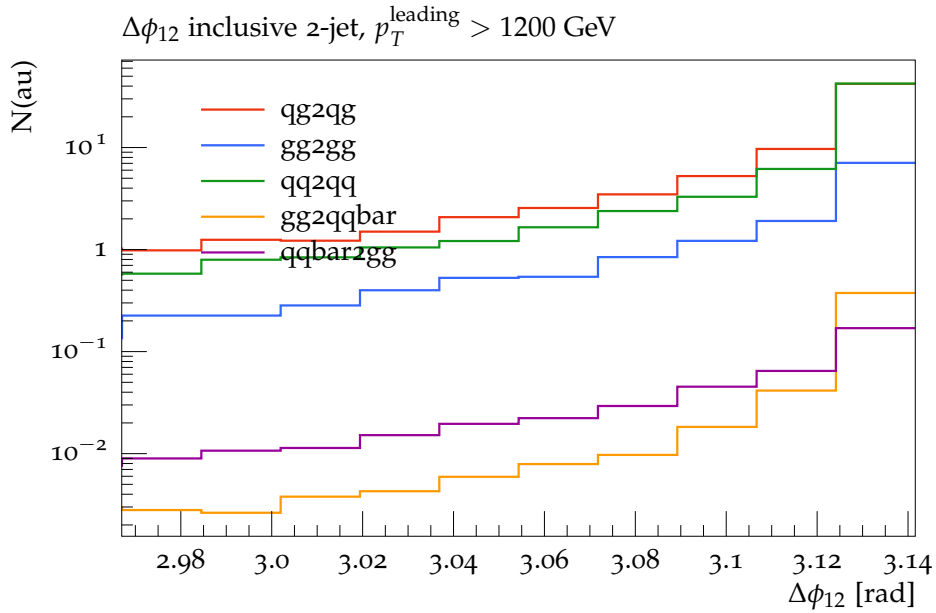
- Tension between data and predictions ∼12%
- Counter intuitive performance
- Non of them is able to describe both simultaneously



Outlook for back-to-back dijet events

- Different QCD sub-processes and correlations with other observables
- Showers in Pyhtia and Herwig (cut-off scales, recoil strategies, ...)
- Go differential in rapidity

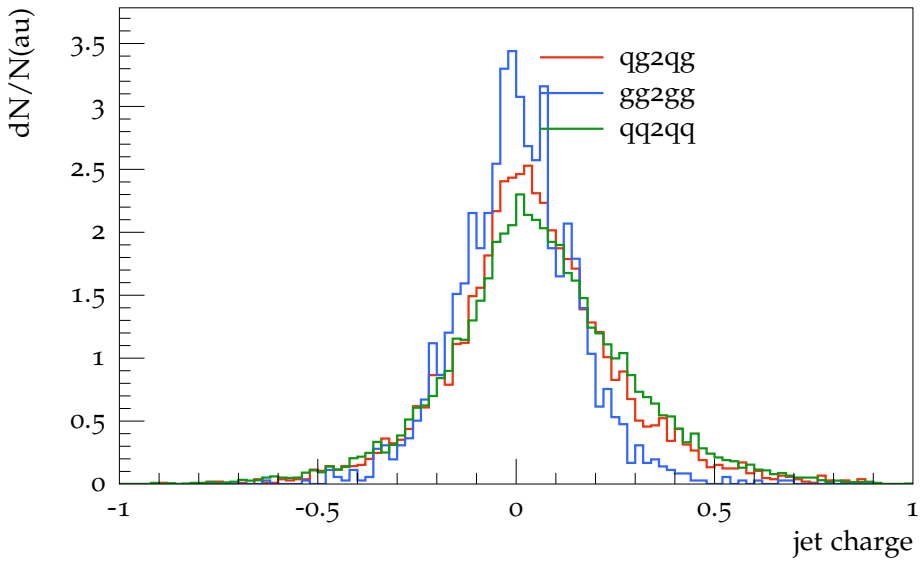


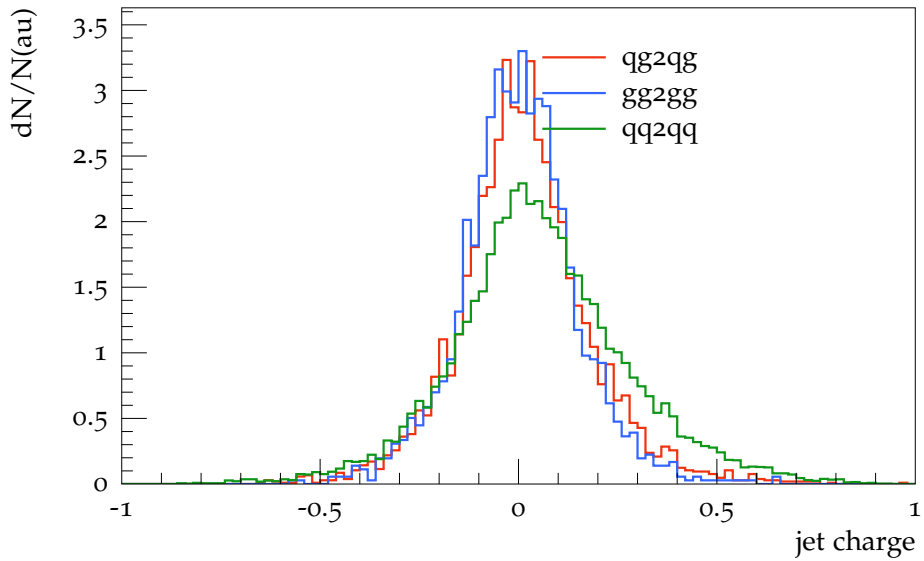


Outlook for back-to-back dijet events

- Different QCD sub-processes and correlations with other observables
- Showers in Pyhtia and Herwig (cut-off scales, recoil strategies, ...)
- Go differential in rapidity

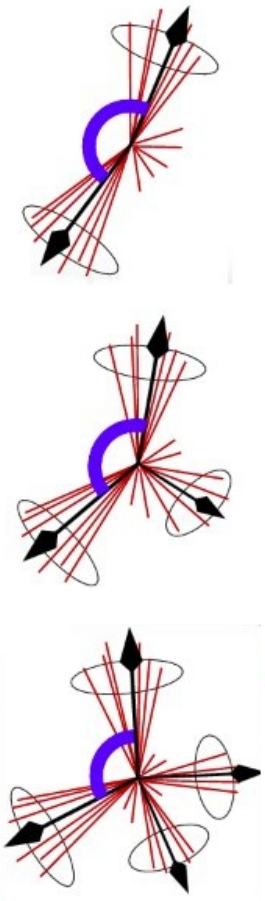
Jet charge





$\Delta\phi_2 j^{min}$ in 4-jets events

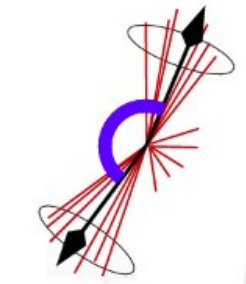
arXiv:1712.05471 [hep-ex]

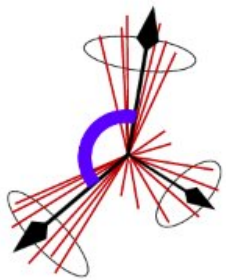


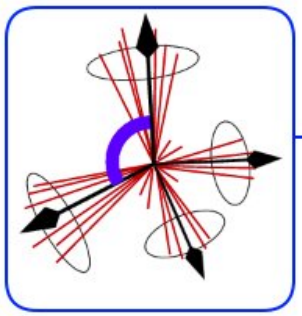
$\Delta\phi_2 j^{min}$ in 4-jets events

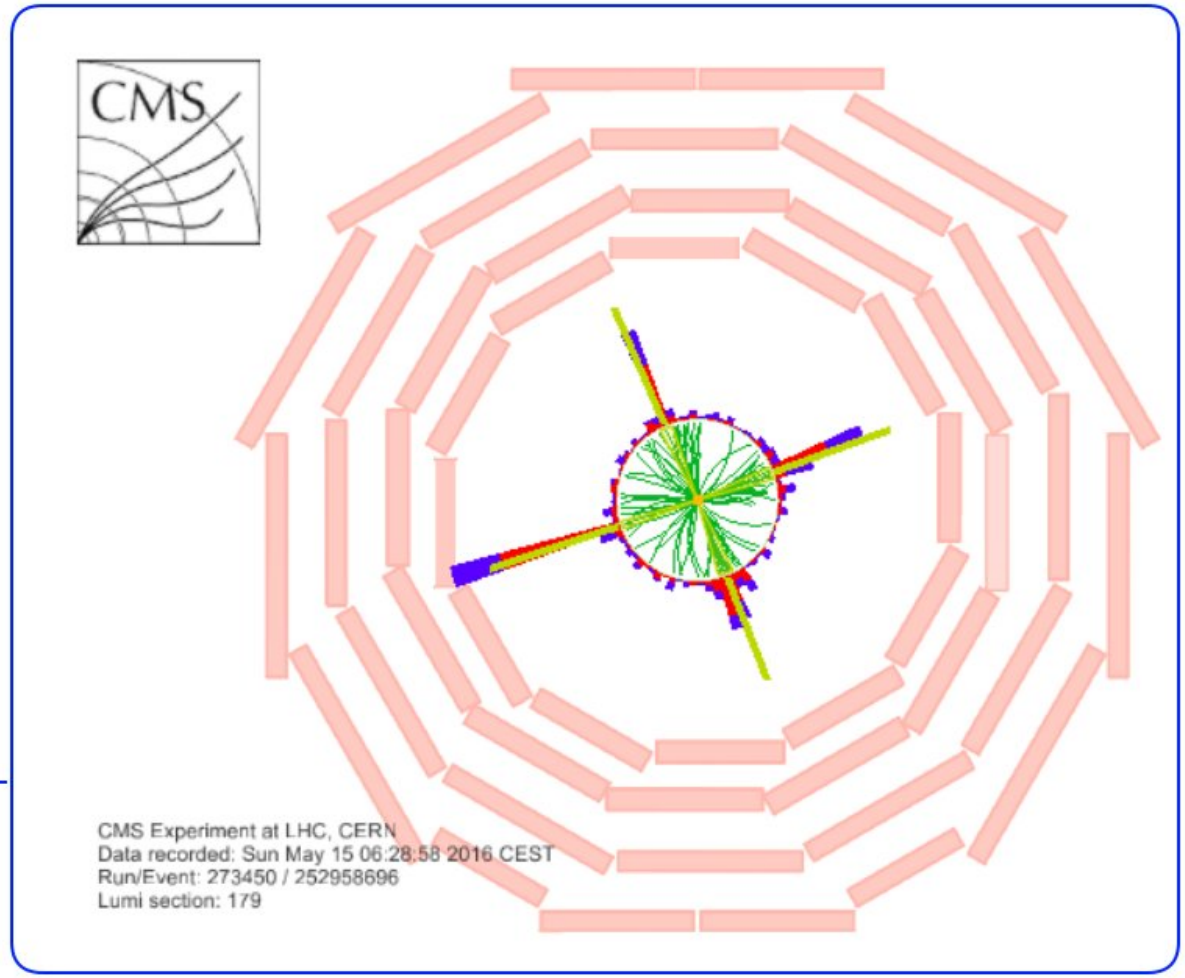
arXiv:1712.05471 [hep-ex]

- Require at least a four jets with $p_T > 100$ GeV
- Minimum $\Delta\phi$ between all the pairs





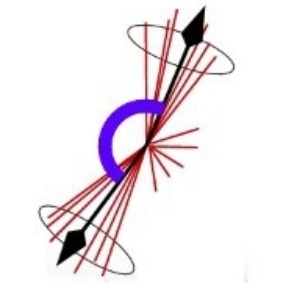


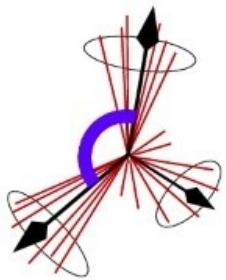


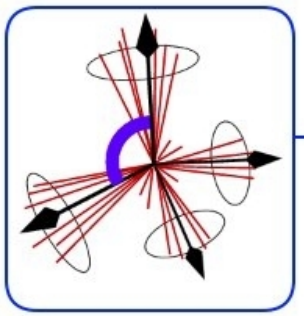
$\Delta\phi_2 j^{min}$ in 4-jets events

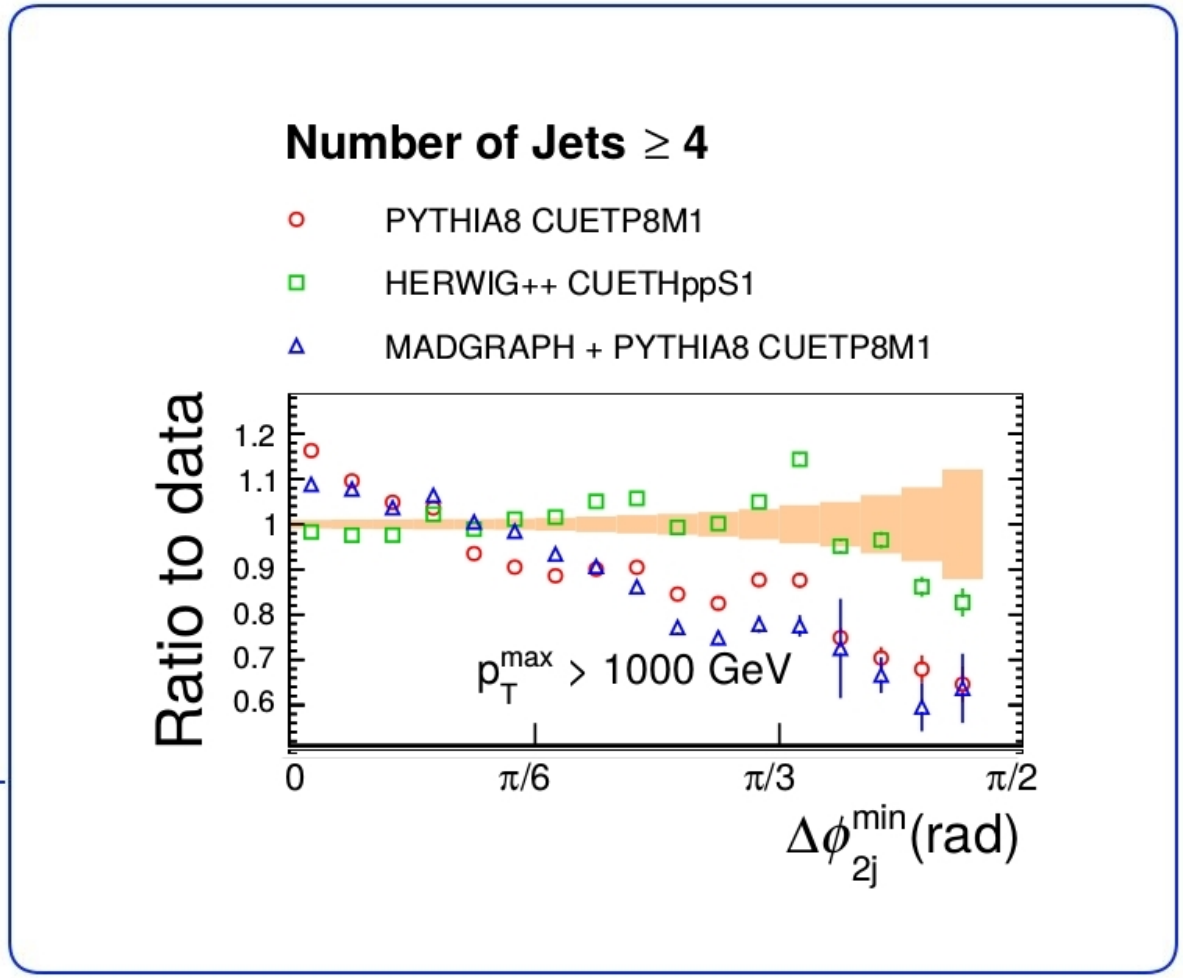
arXiv:1712.05471 [hep-ex]

- Require at least a four jets with $p_T > 100$ GeV
- Minimum $\Delta\phi$ between all the pairs





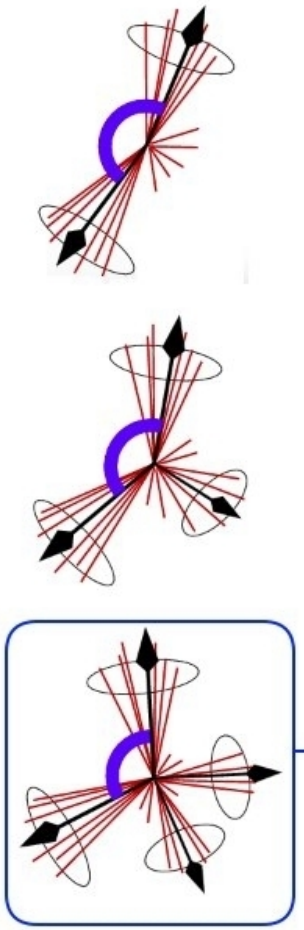


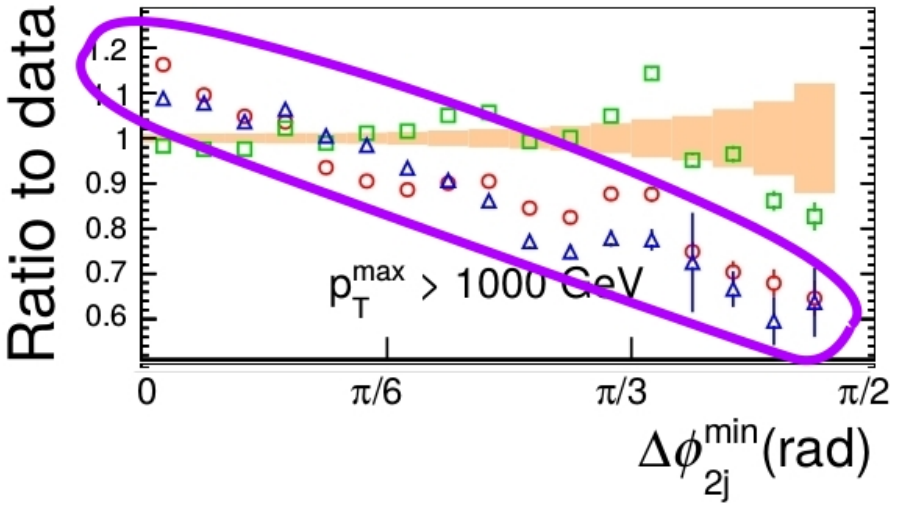


$\Delta\phi_2 j^{min}$ in 4-jets events

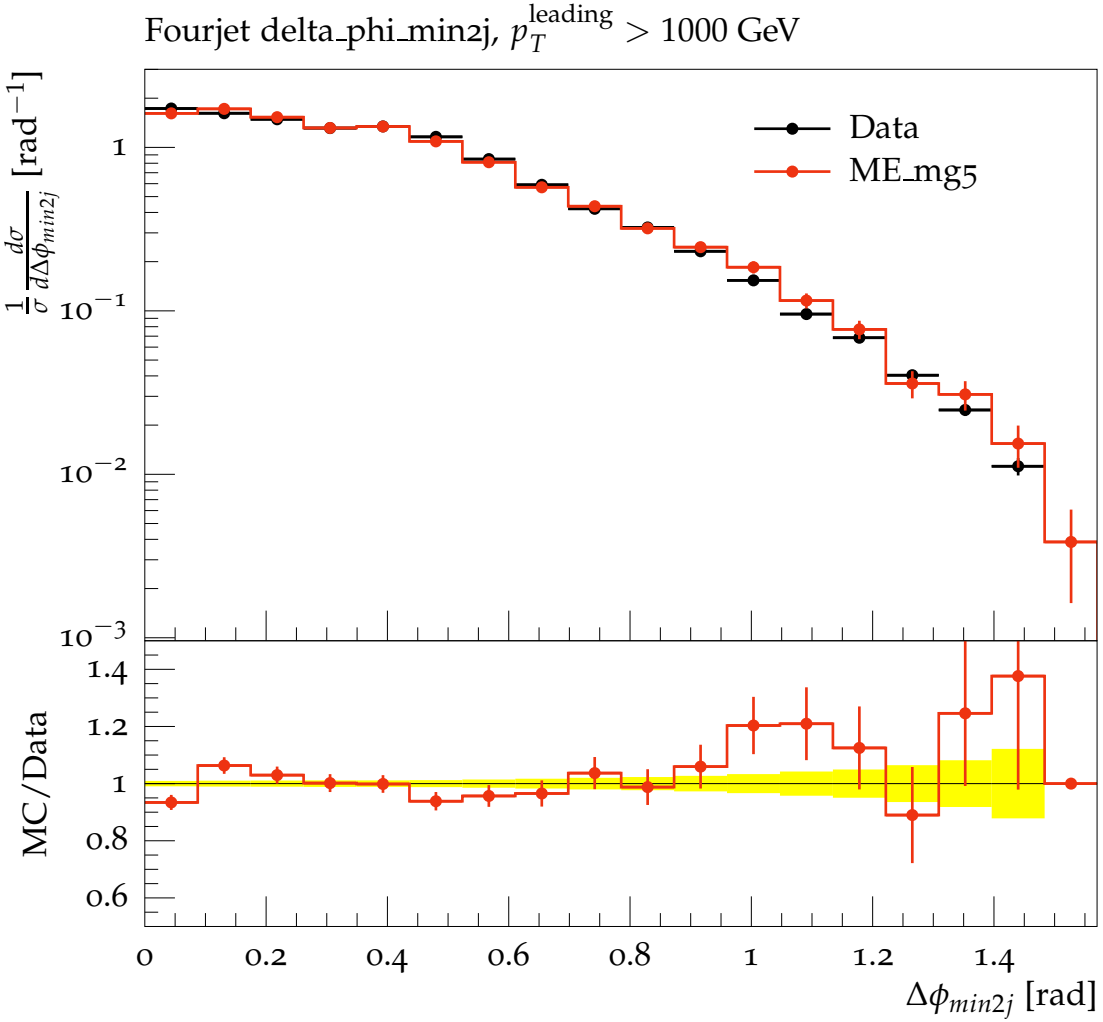
arXiv:1712.05471 [hep-ex]

- Require at least a four jets with $p_T > 100$ GeV
- Minimum $\Delta\phi$ between all the pairs

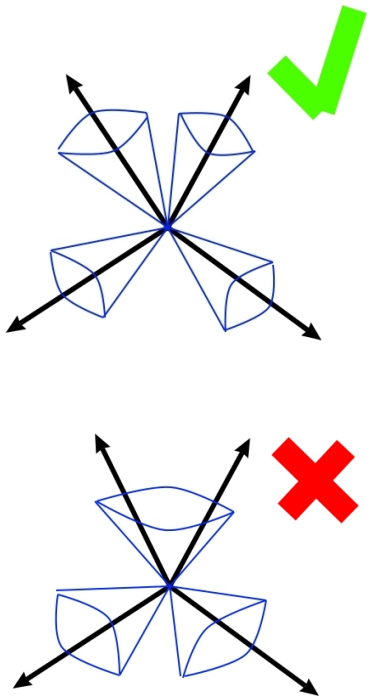




$\Delta\phi_2 j^{min}$ in 4-jets events at the ME level

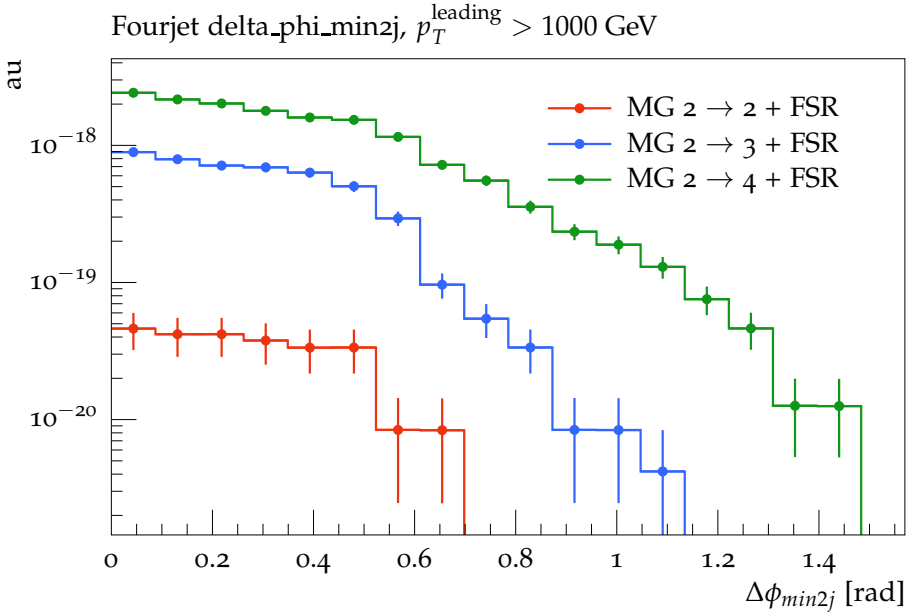


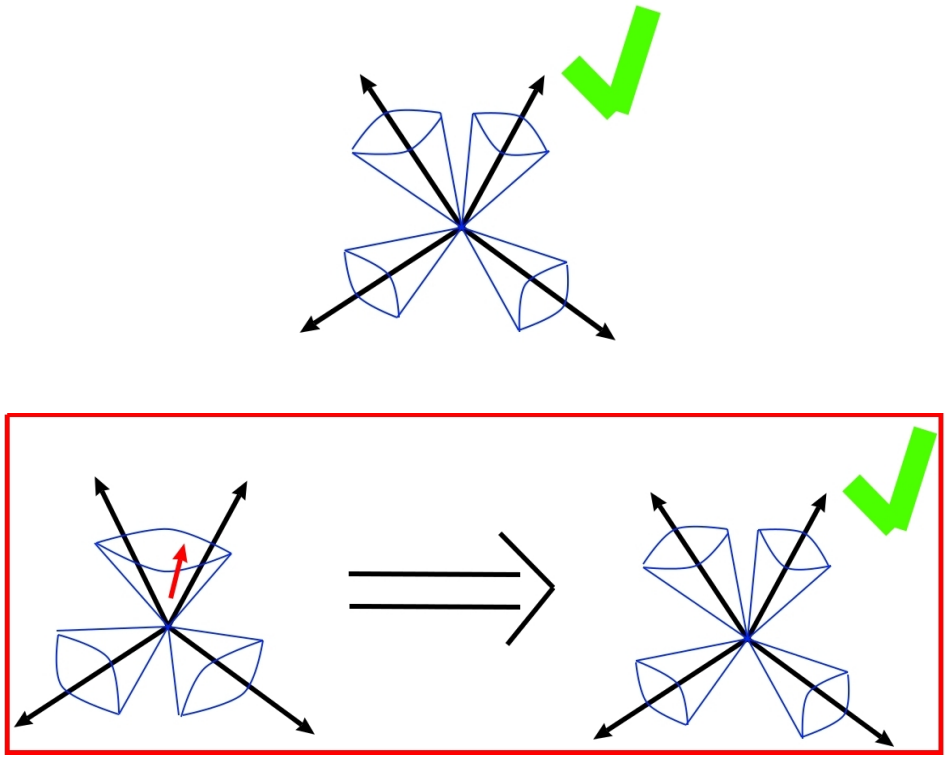
- Four hard jets should be described by $2 \rightarrow 4$ matrix elements



$\Delta\phi_2 j^{min}$ in 4-jets events after PS

- Merging different multiplicities

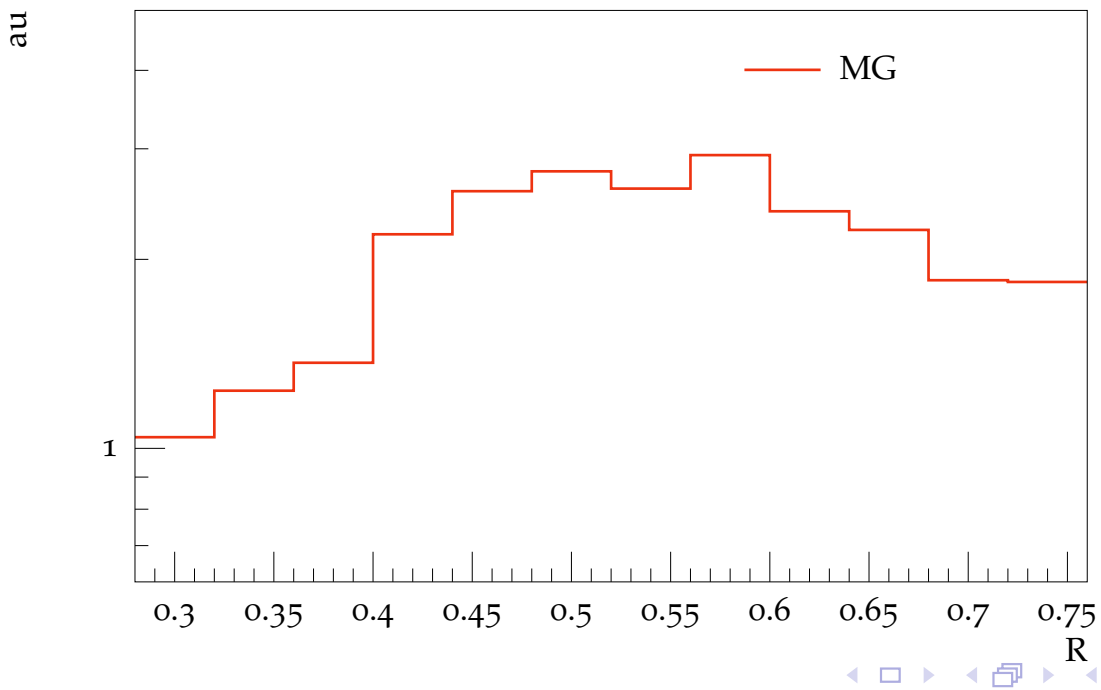




Outlook for 4-jet events

- playing with the generation cuts (kt or cone merging)
- Study other matching schemes (CKKW, CKKW-L)
- Study the effect in other observables
- Investigate in detail the 3-parton events resolved as 4-parton ones by the PS.

Resolving 4-jets, R scan



Thank you.