Top quark mass measurement with $t\bar{t}$ events with $J/\psi \to \mu\mu$ in final state

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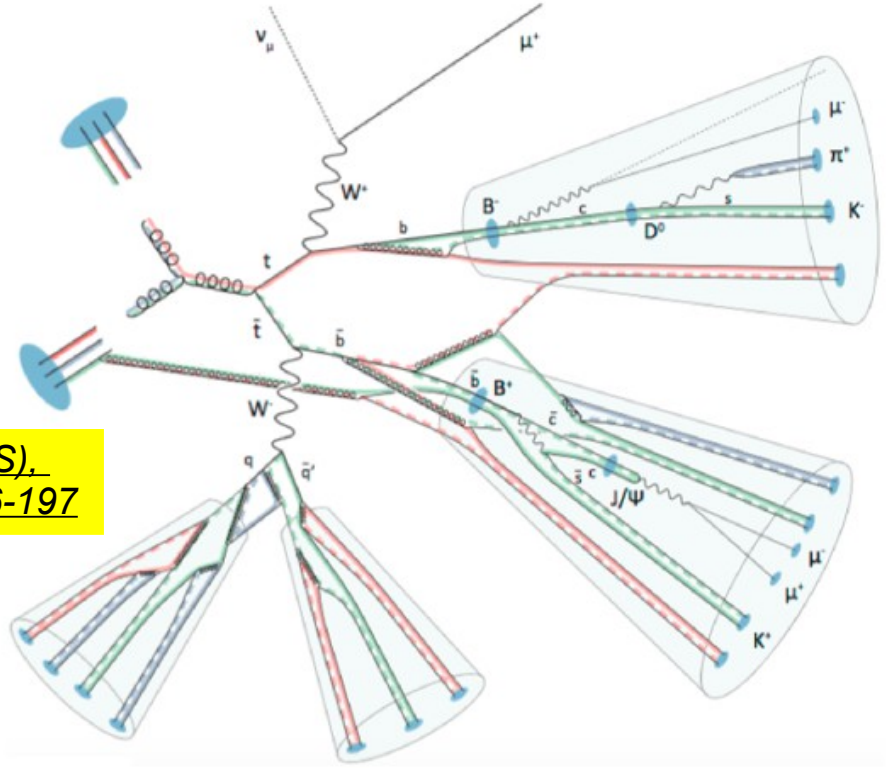
Study of $t\bar{t}$ pairs with a J/ψ ($b \to J/\psi \to \mu\mu$) in final state offer alternative methods to measure the top quark mass, using the strong correlation between m(top) and m(lJ/ψ)

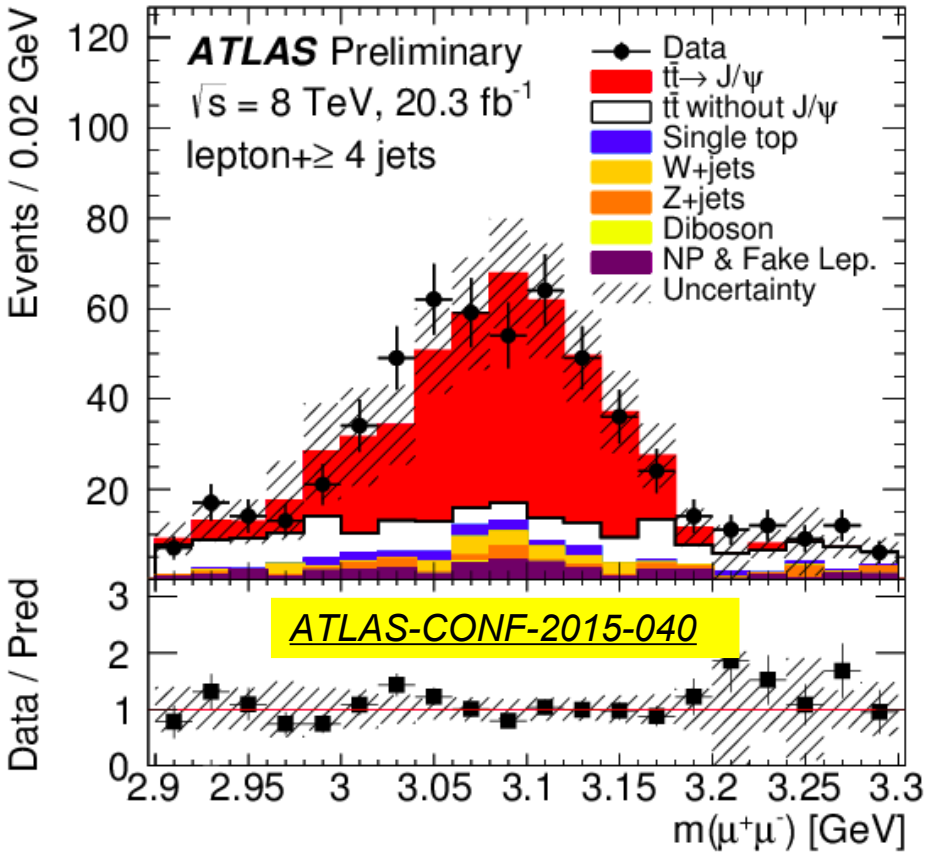


PhD E. Bouvier (CMS), CERN-THESIS-2016-197

Given the low BR(~3×10^{-4}) of this process, it could benefit from large stat. from HL-LHC

Event selection

Select lepton (e,μ)+≥4 jets + pairs of additional muons with opposite charged tracks



Signal :

- ttbar+st with a J/ψ

Background :

- combinatorial
- tt+J/ψ
- ttV, W/Z+jets, diboson
- NP and fake leptons

@8 TeV we selected ~600 such events

Analysis is ongoing @13 TeV

Strategy and Person power

Use correlation between m(top) and m(lJ/ψ) : build templates on simulated data at different top quark masses. A "calibration curve" can relate the observed m(lJ/ψ) on data to m(top).
Obtain detector (JES/JER, lepton etc.) and $t\bar{t}$ modelling (generator, fragmentation …) uncertainties from simulation.

As m(lJ/ψ) is obtained through leptons, expect σ(JES/JER) to be reduced
Can gain in precision through a combination with other methods/channels

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With similar stat CMS obtained m(top)=173.5 ± 3.0 (stat) ± 0.9 (syst) GeV

@3000 fb-1 : σ(stat)~0.15, will be dominated by systematic uncertainties (fragmentation, etc...)

Person power :

F. Derue (0.2 FTE), J. Zahreddine (>0.1 FTE – but qualification task ongoing)

- also involved in similar Run2 analysis