Status report

Status

- **HIN-16-023 : Upsilon RAA at 5.02 TeV**
  - **CWR ended, working on comments**
  - **Bug found in the systematic estimation**

- **Upsilon RpPb at 5.02 TeV**
  - **Aim for QM**
  - **RpPb vs pT, rapidity**
  - **RFB if possible**

- **Possible analysis in future**
  - **Quarkonia in pPb 8.16 TeV**
  - **Quarkonia in XeXe 5.44 TeV**

Nominal & Alternative PDF

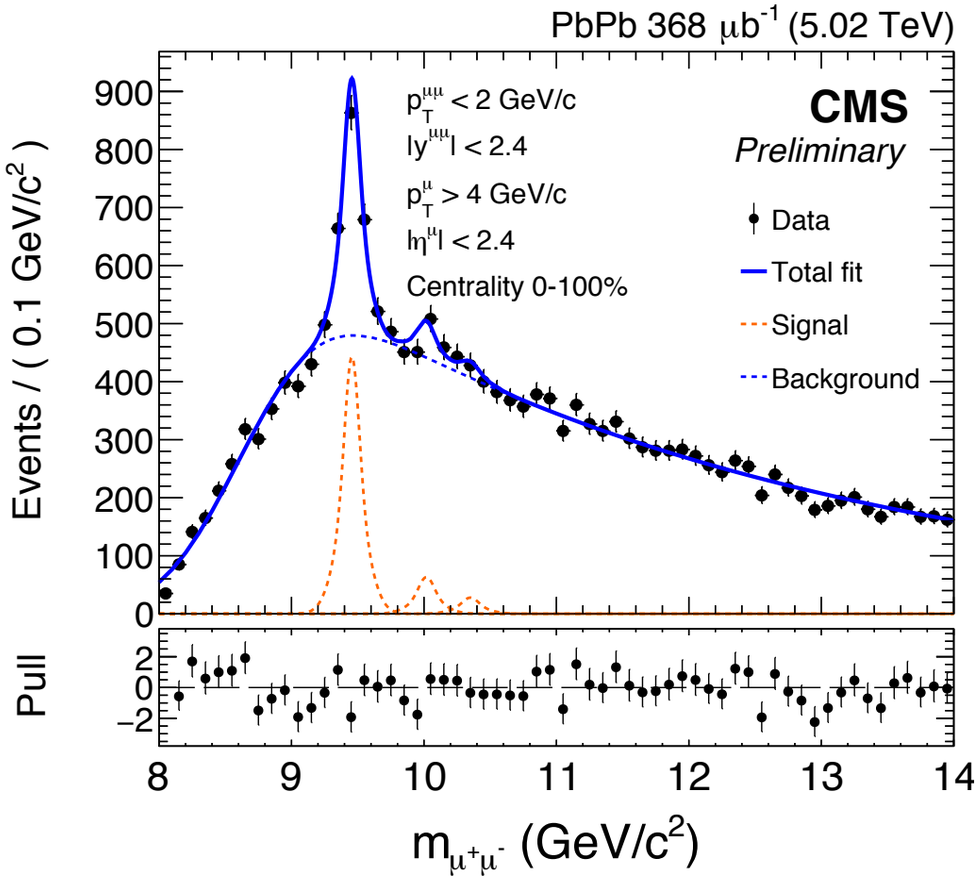
- Signal PDF (Double CB) ; parameter : n, α, σ, f, x

$$\Sigma_{1S}\left(m_{\mu\mu};m_0,n,\alpha,\sigma_0,f,x\right)=f\cdot \mathrm{CB}_1\left(m_{\mu\mu};m_0,n,\alpha,\sigma_0\right)+(1-f)\cdot \mathrm{CB}_2\left(m_{\mu\mu};m_0,n,\alpha,x\cdot\sigma_0\right)$$

$$\mathcal{S}(m_{\mu\mu};\mathcal{N}_{1S},\mathcal{N}_{2S},\mathcal{N}_{3S},m_0,n,\alpha,\sigma_0,f,x)=\mathcal{N}_{1S}\cdot\Sigma_{1S}\left(m_{\mu\mu}\right)+\mathcal{N}_{2S}\cdot\Sigma_{2S}\left(m_{\mu\mu}\right)+\mathcal{N}_{3S}\cdot\Sigma_{3S}\left(m_{\mu\mu}\right)$$

- Background PDF (Erf*Exp) ; parameter : μ, σ, **ƛ**

$$\mathcal{B}\left(m_{\mu\mu};\mu,\sigma,\lambda\right)=\exp\left(-\frac{m_{\mu\mu}}{\lambda}\right)\cdot\frac{1+\mathrm{Erf}\left(\frac{m_{\mu\mu}-\mu}{\sqrt{2}\sigma}\right)}{2}$$

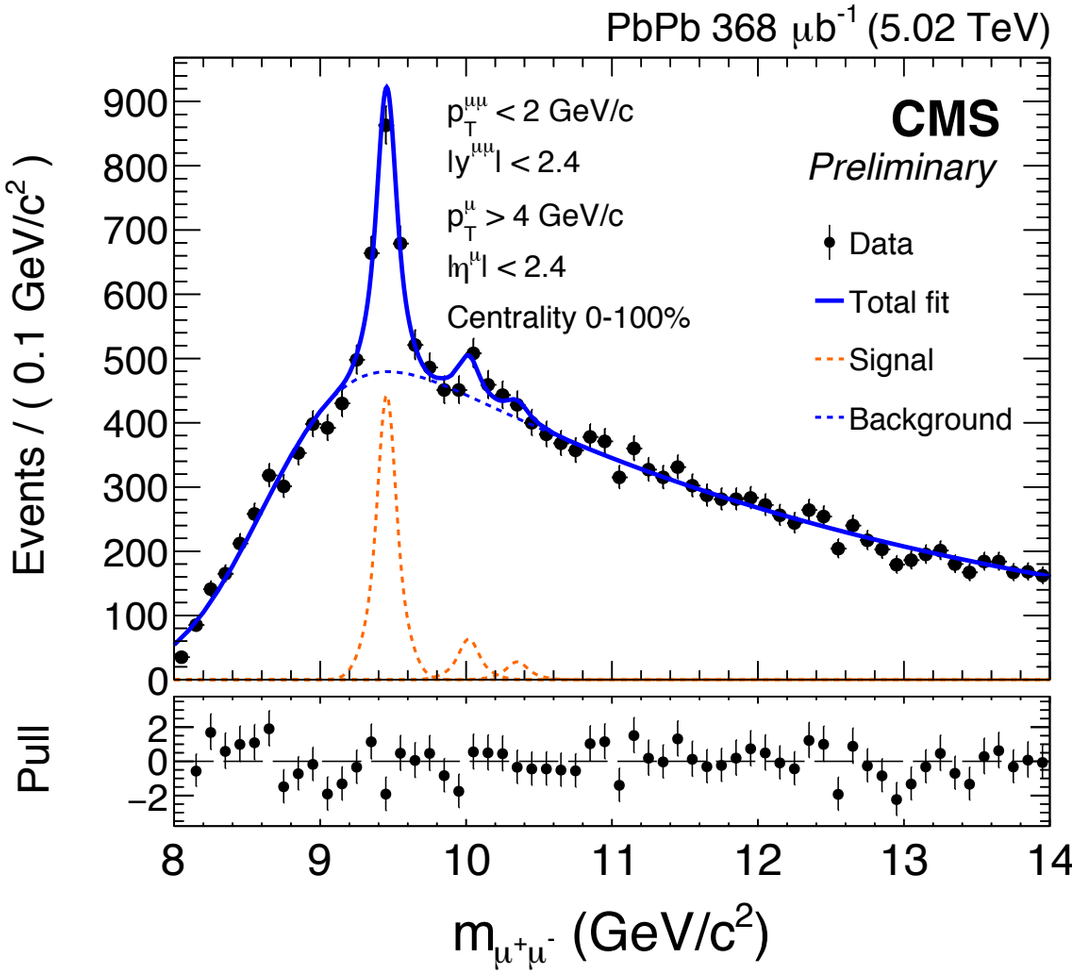


- Set all to be free in the nominal fit
- Fixed by MC in 15-001 and 16-008

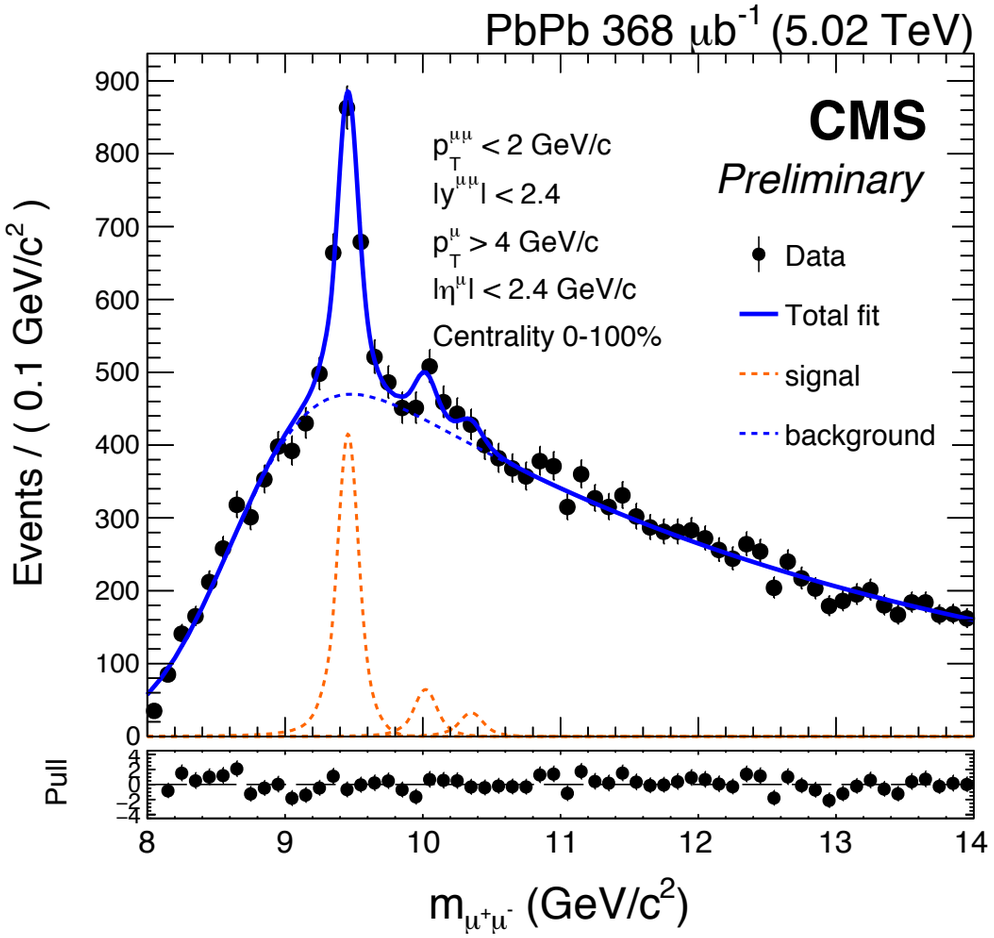
- Signal alternative PDF : CB+Gaus
- Background alternative PDF :
  1. 4th order polynomial
  2. nominal + linear (Erf*Exp + linear)

Background Systematic

Nominal



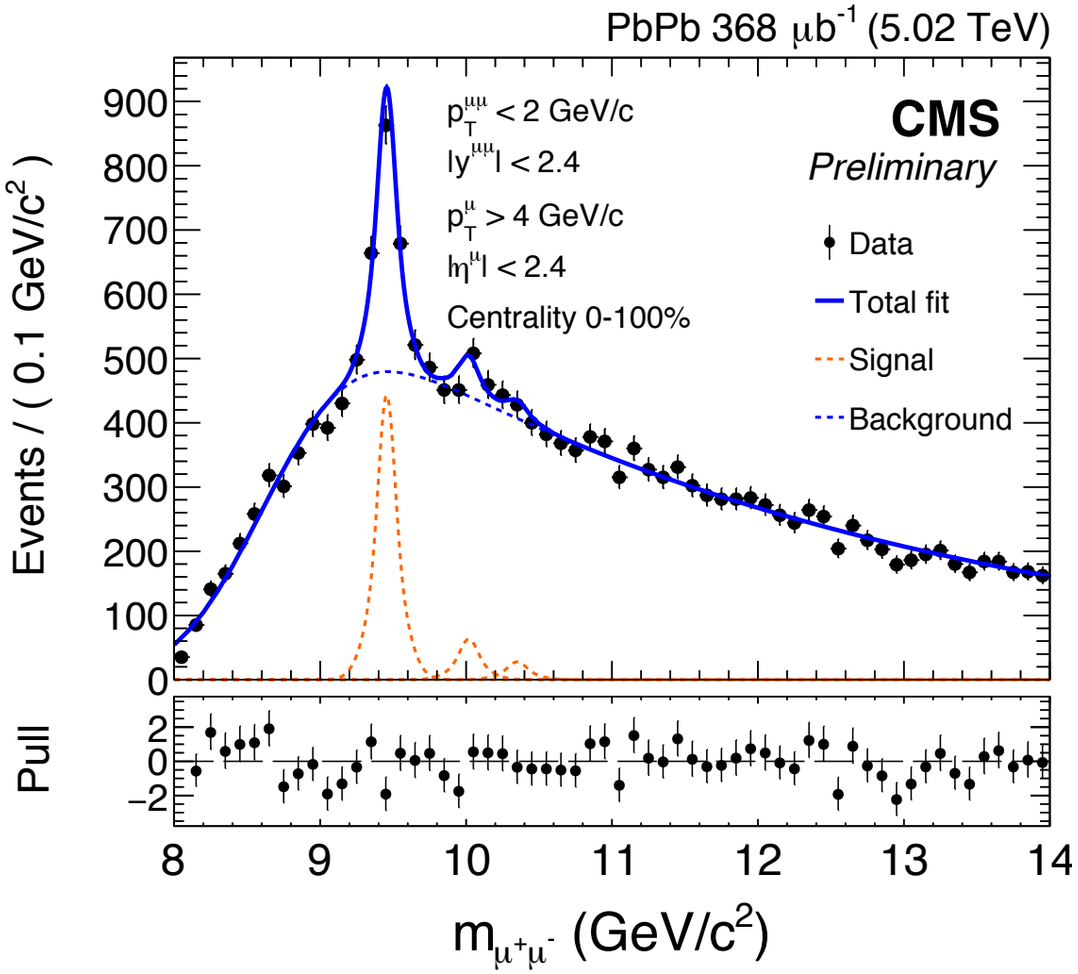
Bg alternative (nominal+linear)



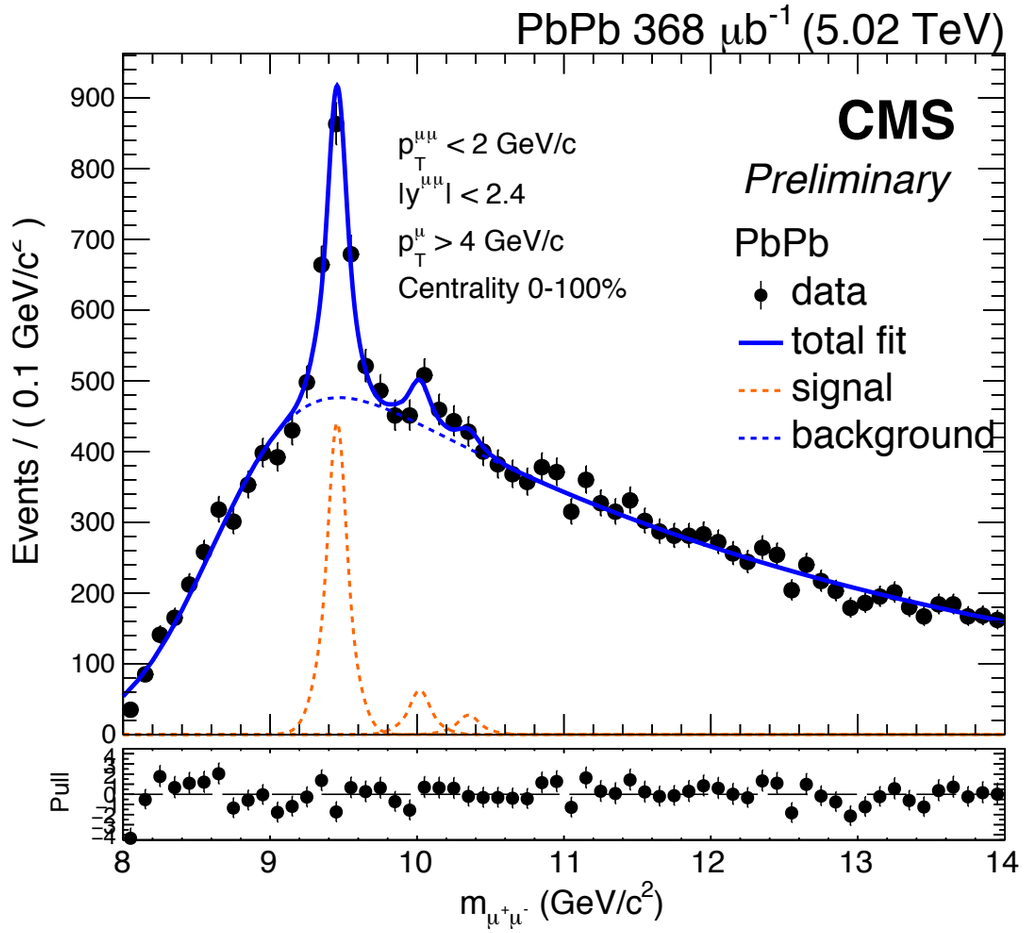
- Background PDF changed to the alternative PDF (nominal+linear)
- **In the alternative fit, the signal parameters are fixed additionally by the obtained values from MC (What had been done - bug in code)**
- Same done for 4th order polynomial

Signal Systematic

Nominal



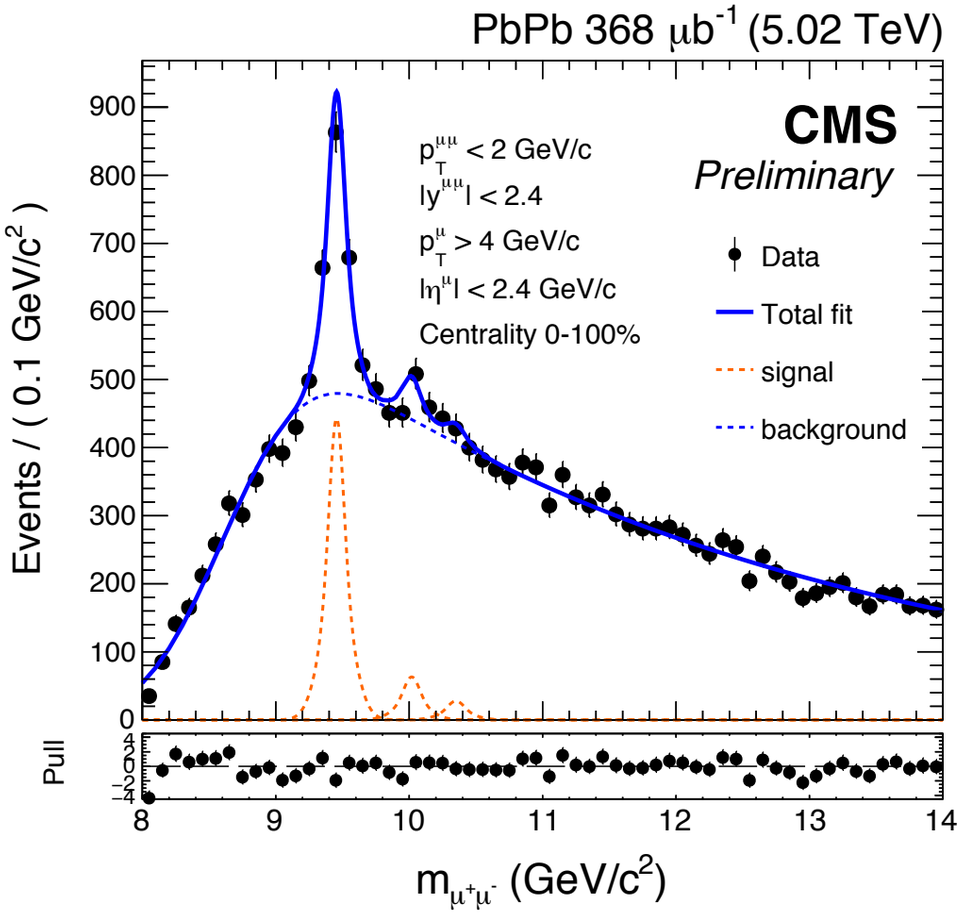
Signal alternative (CB+Gaus)



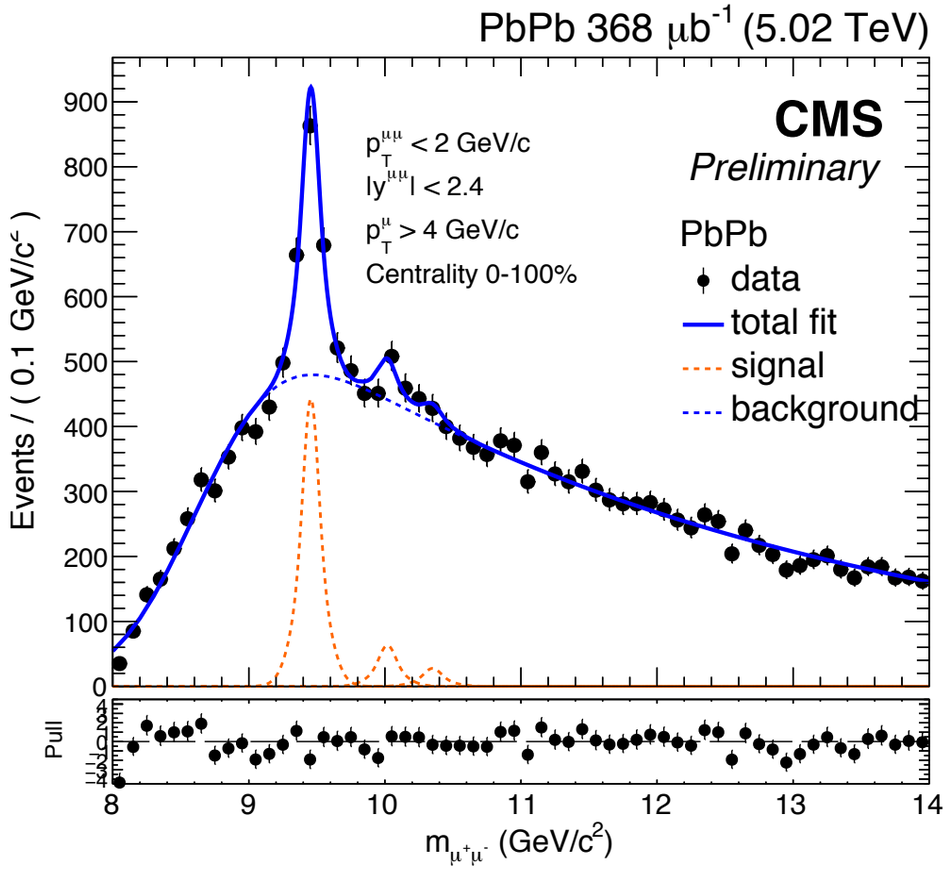
- Signal PDF changed to the alternative PDF (CB+Gaus)
- **In the alternative fit, the background shape is not fixed from the nominal : background pdf parameters are also left to be free**

New systematic study

Bg alternative (nominal+linear)



Signal alternative (CB+Gaus)



- Used alternative PDF
- **Signal (Background) parameters are fixed when using alternative background (signal) PDF**

Result

Current method

- Signal PDF variation
  - Alternative signal PDF : CB+Gaus
  - Bg parameters to be **free**
- Background PDF variation
  - Alternative bg PDF
    : 4th order pol. & nominal+linear
  - Fix signal parameters by **MC fit**

Suggested new method

- Signal PDF variation
  - Alternative signal PDF : CB+Gaus
  - Bg parameters to be **fixed from nominal fit**
- Background PDF variation
  - Alternative bg PDF
    : 4th order pol. & nominal+linear
  - Fix signal parameters by **nominal fit**

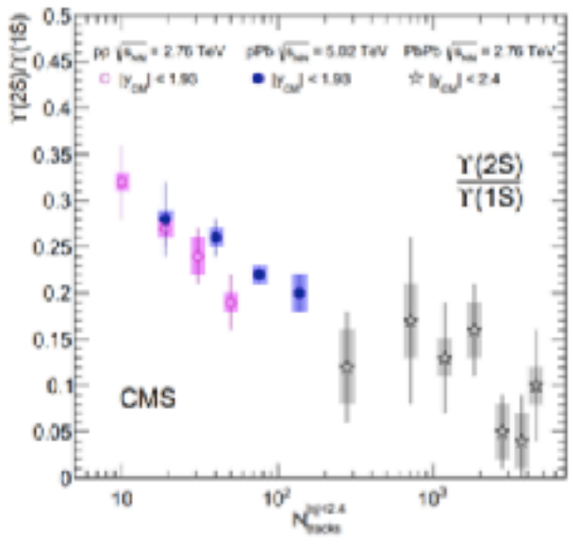
Nominal Y(1S) 877.053	Signal Variation Old 879.628	Signal Variation New 876.617
	Bg Variation Old 951.648	Bg Variation New 877.321

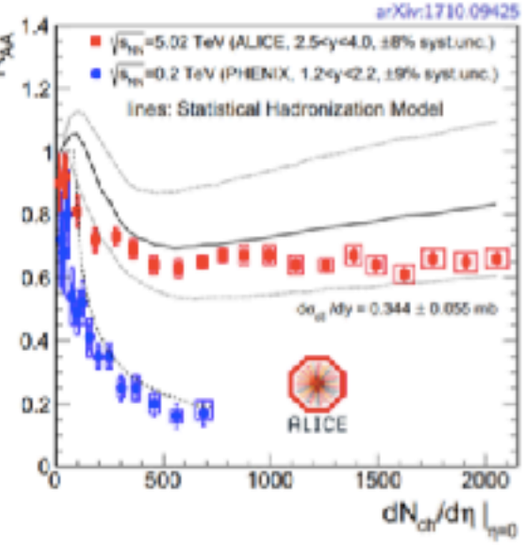
Suggest to use the new method for systematic estimation

Quarkonia in pPb 8.16 TeV

Yenjie's slide in HL-LHC conference

- What is the mechanism of Quarkonia suppression in pPb and PbPb collisions?
- Why are the excited states of Quarkonia more suppressed than the ground state in high multiplicity pp and pPb events?
- Have we observed low p_T J/ψ from recombination?



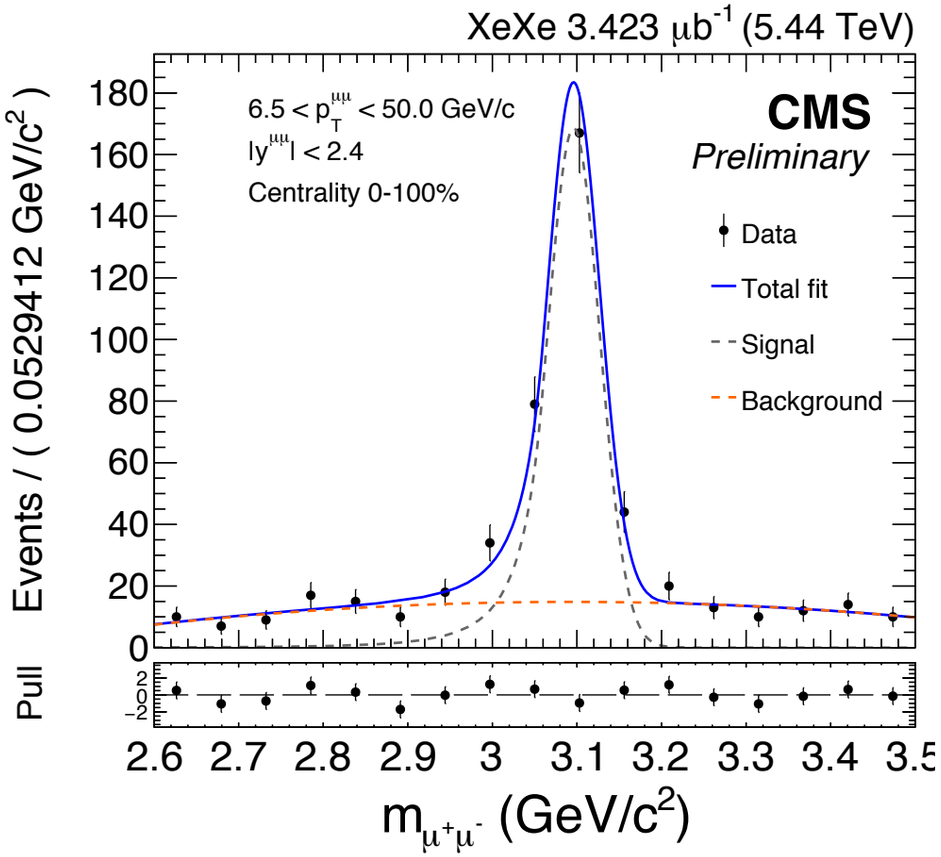


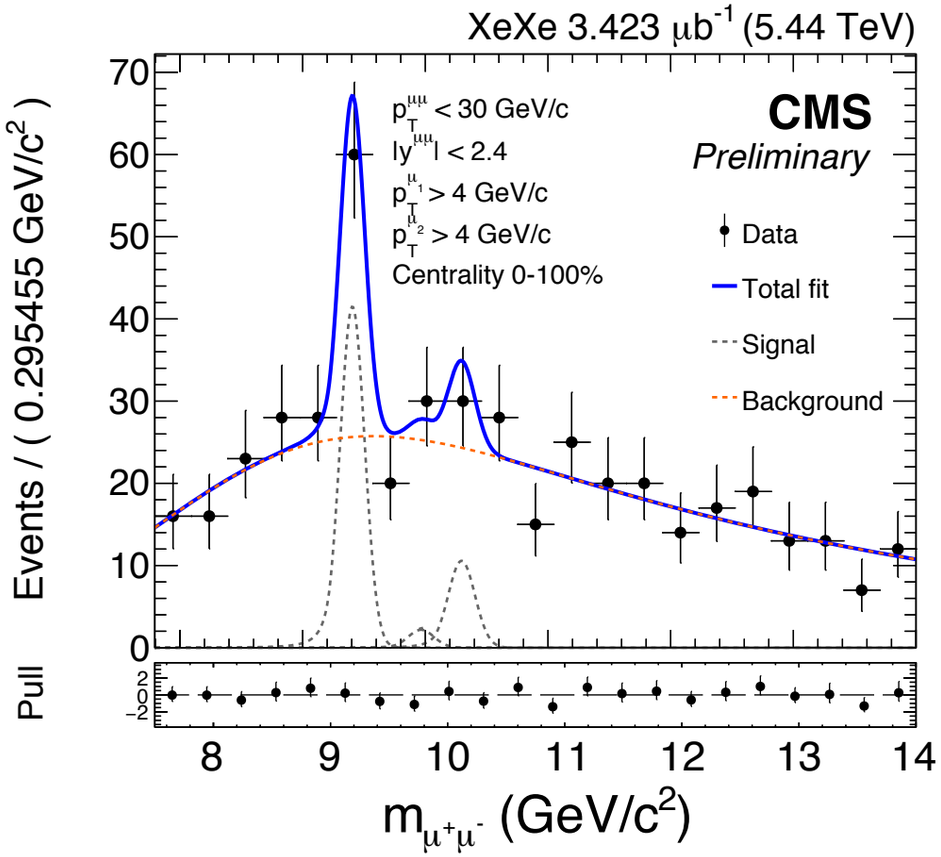
- **~180 nb-1 pPb 8.16 TeV**
  - **pp 8TeV reference (pT>5GeV)**
  - **RpPb vs pT, rapidity, event activity**
  - **RFB vs event activity, pT**

Onia Tree Skim Files

RAA = [N(XeXe)/N(pp)] * [lumi_pp/lumi_XeXe*A²]

N(XeXe) Jpsi ~ 272, N(XeXe) Y(1S) ~37
lumi_XeXe = 3.423 ub^{-1}, A = 129





R_{AA} Jpsi (XeXe) = 0.400 +/- 0.032
R_{AA} Jpsi (PbPb in |y|<0.4) = 0.360 +/- 0.009

R_{AA} Y(1S) (XeXe) = 0.553 +/- 0.153
R_{AA} Y(1S) (PbPb) = 0.341 +/- 0.013