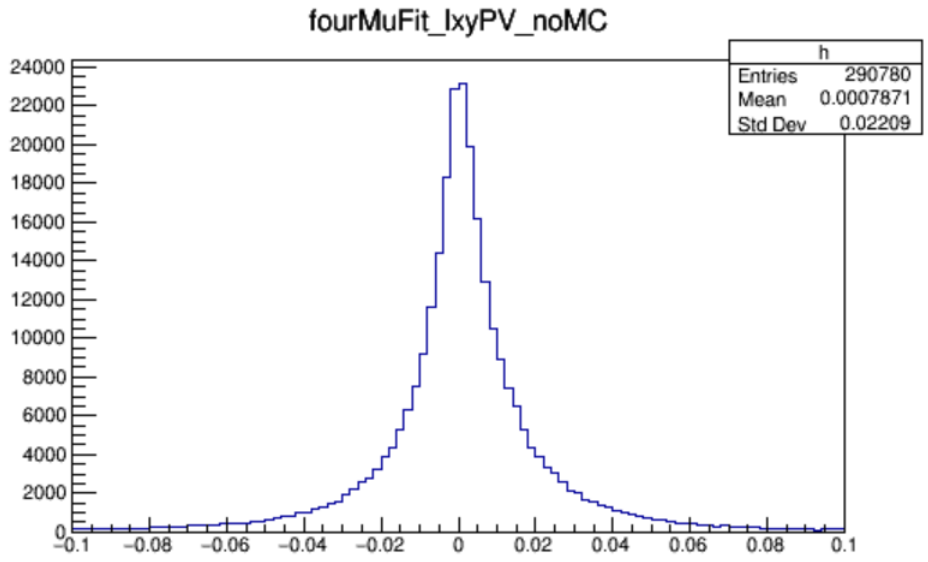
中国科学院高能物理研究所
Institute of High Energy Physics
Chinese Academy of Sciences

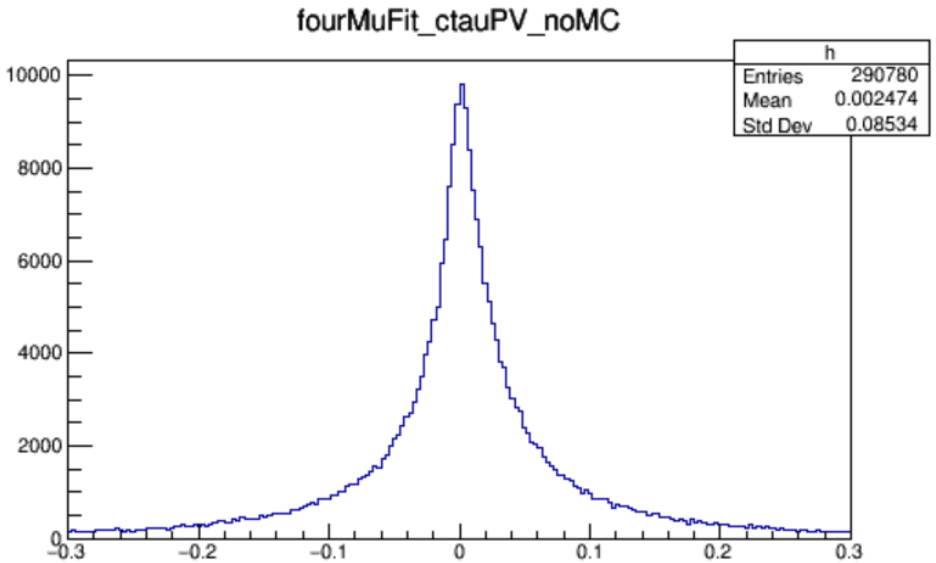
Double Jpsi work status

Taozhe YU

B decay sample

- $b\bar{b} \rightarrow J/\psi \ J/\psi$
- Sample for 2018 has been produced
- Tight GEN filters were applied (pT > 3.3GeV, $|\eta|$ < 2.5)

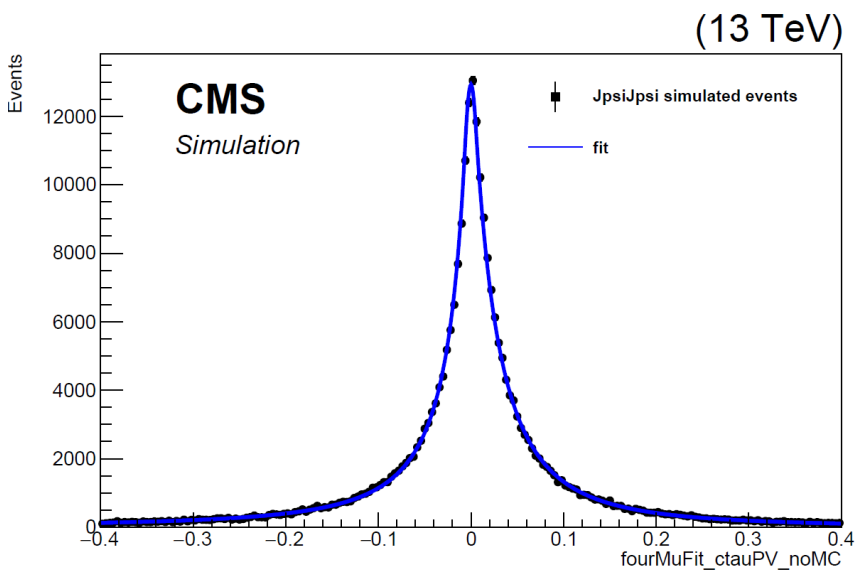




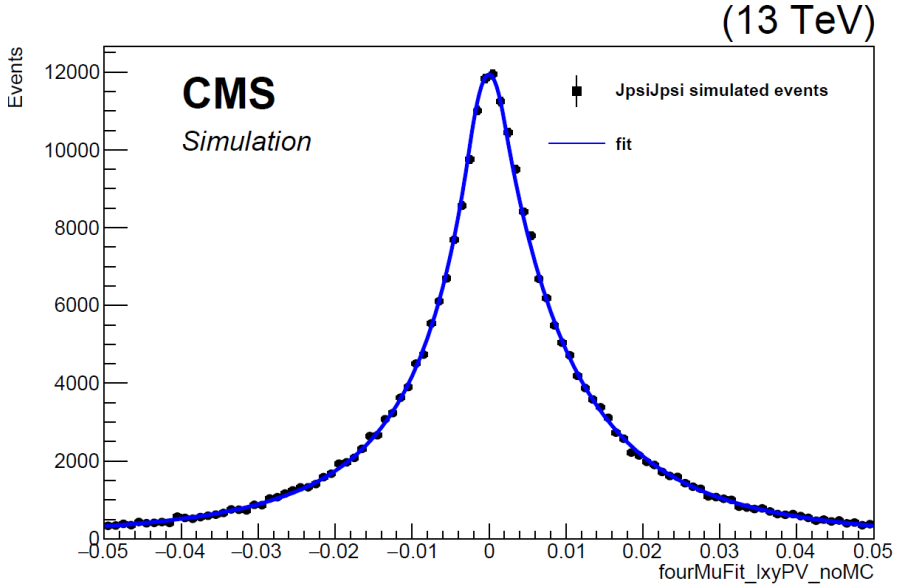
Fit

- Using double-sided Crystal Ball (DSCB) function to fit Lxy and Ctau

$$f_S(x;\vec{\theta}) = \begin{cases} \left(\frac{n_L}{|\alpha_L|}\right)^{n_L} \exp\left(\frac{-|\alpha_L|^2}{2}\right)\left(\frac{n_L}{|\alpha_L|} - |\alpha_L| - \frac{x-\mu}{\sigma}\right)^{-n_L}, & \text{for } \frac{x-\mu}{\sigma} \leq -\alpha_L \\ \exp\left(-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right), & \text{for } -\alpha_L < \frac{x-\mu}{\sigma} < \alpha_R \\ \left(\frac{n_R}{|\alpha_R|}\right)^{n_R} \exp\left(\frac{-|\alpha_R|^2}{2}\right)\left(\frac{n_R}{|\alpha_R|} - |\alpha_R| + \frac{x-\mu}{\sigma}\right)^{-n_R}, & \text{for } \frac{x-\mu}{\sigma} \geq \alpha_R, \end{cases}$$

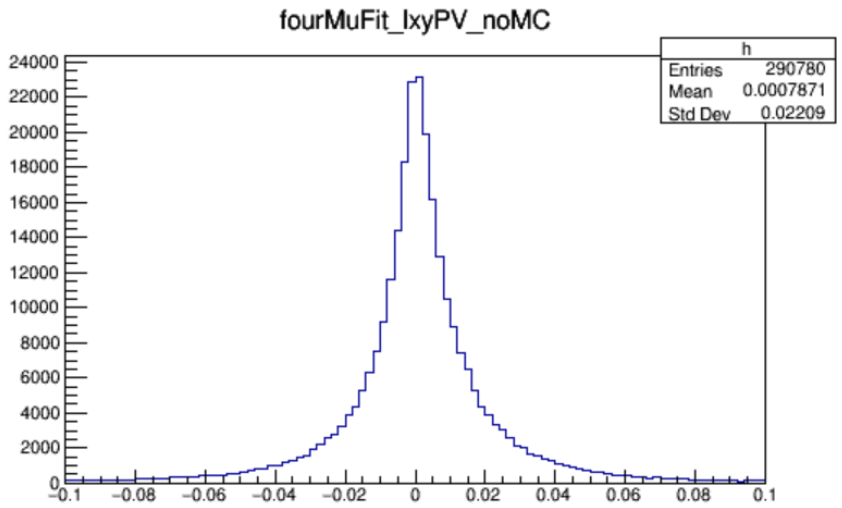


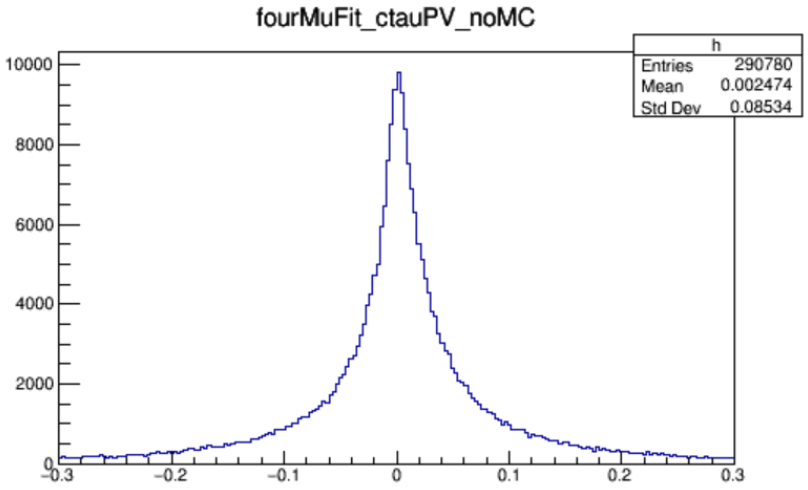
FourMuFit_ctauPV

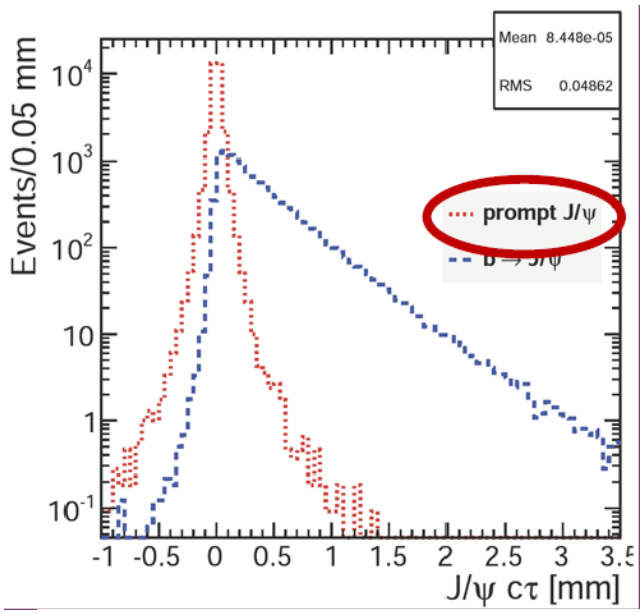


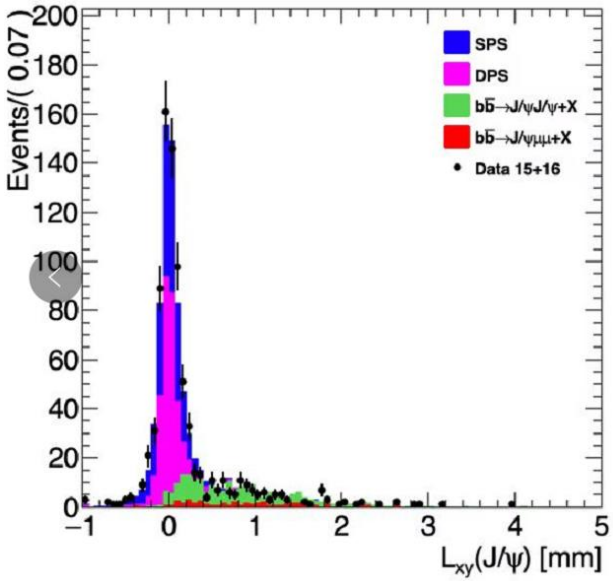
FourMuFit_LxyPV

Issue









- Our Lxy and ctau distribution are different from Others

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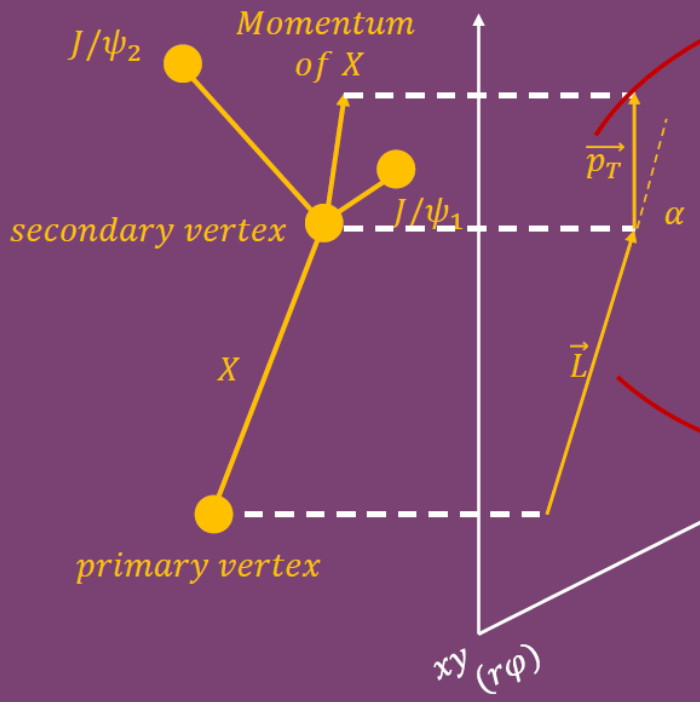
backup

Ntuple fragment about distance



$\vec{L}$: vdiff

$\vec{p_T}$: pperp

$|\vec{L}|$: distXY.value()

The L_{xy} is calculated as

$$L_{xy}(J/\psi) = \vec{L} \cdot \vec{p}_T(J/\psi)/|p_T(J/\psi)|, \quad (22)$$

where $\vec{L}$ is the vector from the primary vertex to the J/ψ decay vertex in the r-ϕ plane and $\vec{p}_T(J/\psi)$ is the transverse momentum vector. To reduce the dependence on the J/ψ transverse momentum bin size and placement, a new variable x, called pseudoproper decay time, is used instead of L_{xy},

$$x = L_{xy}(J/\psi) \cdot M(J/\psi)/p_T(J/\psi), \quad (23)$$

where the $M(J/\psi)$ is taken as the known J/ψ mass [22]. A

cosAlpha: $\cos\alpha = \vec{L}\cdot\vec{p_T} / |\vec{L}|\cdot|\vec{p_T}|$

lxy: $|\vec{L}|$

ctauPV: $x = |\vec{L}| \cdot \cos\alpha \cdot M(X)/|\vec{p_T}|$

$= \vec{L}\cdot\vec{p_T} / |\vec{p_T}| \cdot M(X)/|\vec{p_T}| = L_{xy} \cdot M(X)/|\vec{p_T}|$

lxyPV: $L_{xy} = \vec{L}\cdot\vec{p_T} / |\vec{p_T}|$

DPS Lxy and Ctau Fit

- Using double-sided Crystal Ball (DSCB) function to fit Lxy and Ctau

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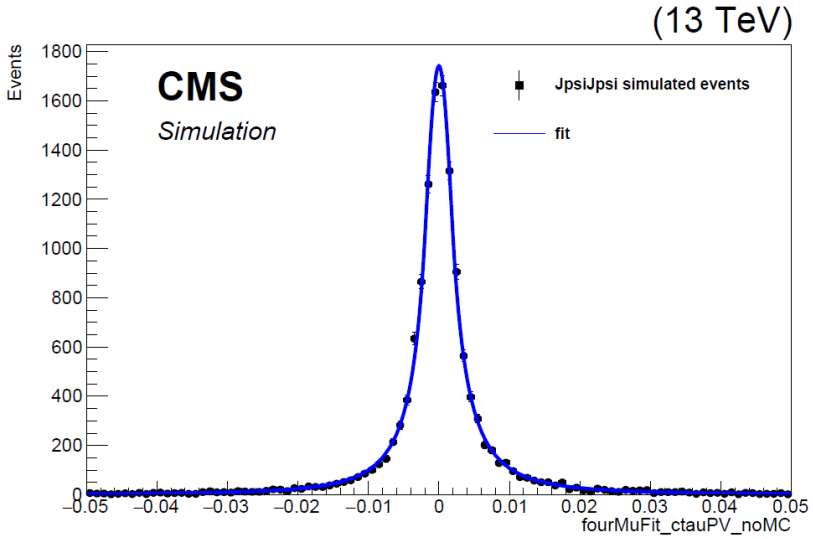
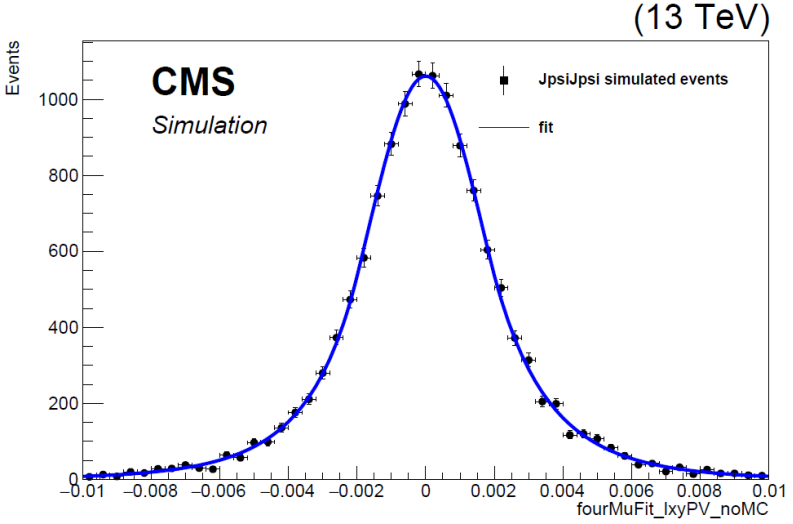


FourMuFit LxyPV



FourMuFit CtauPV