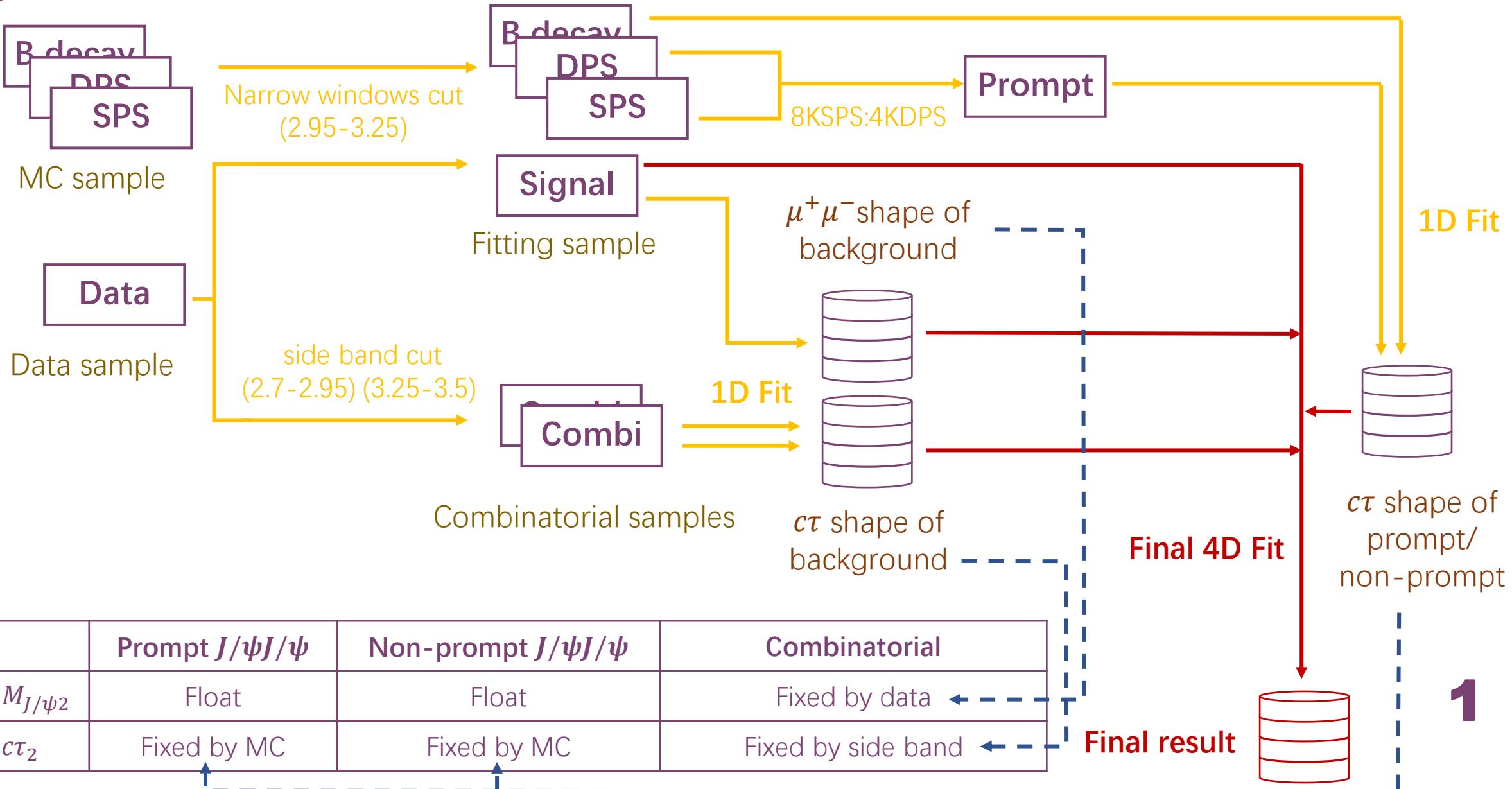


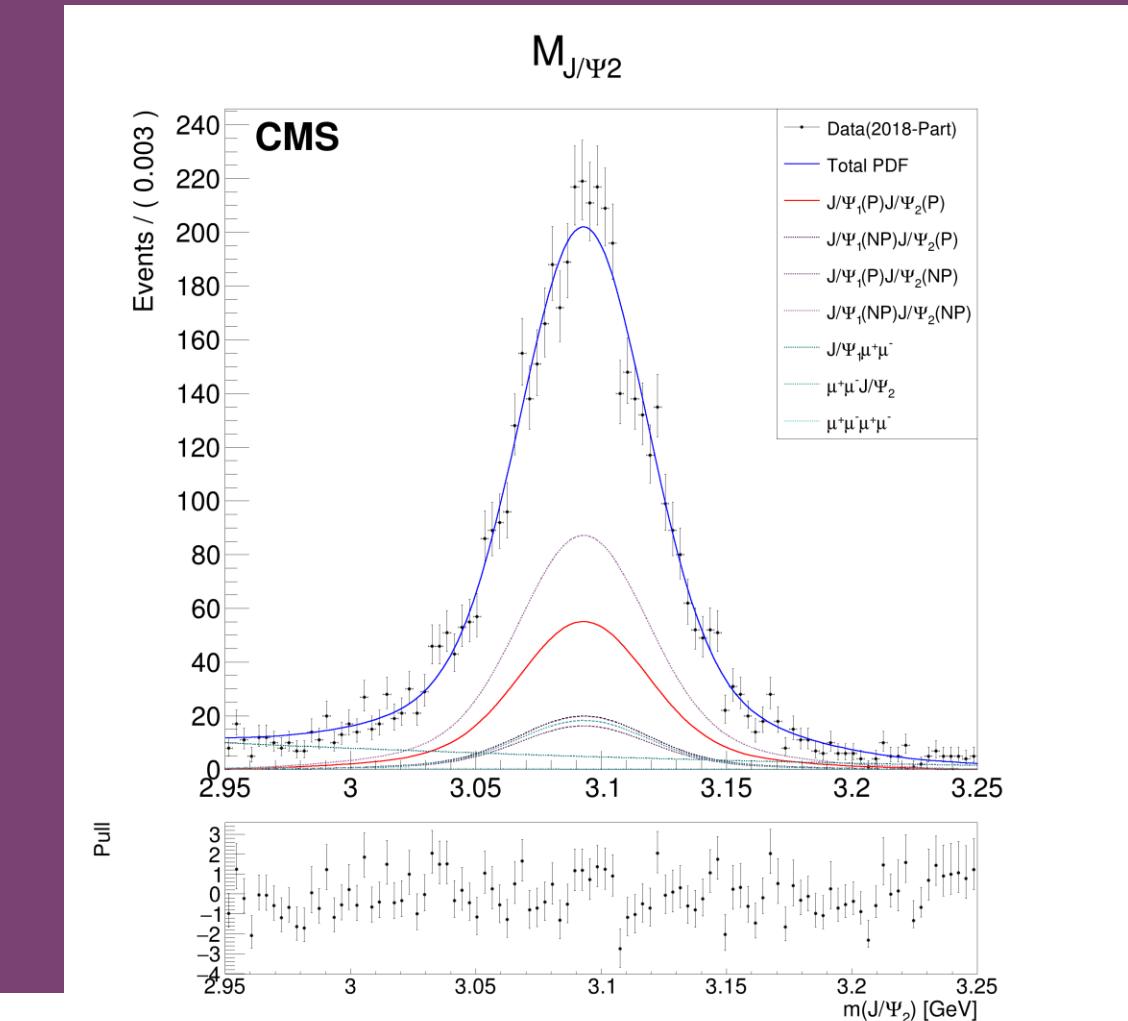
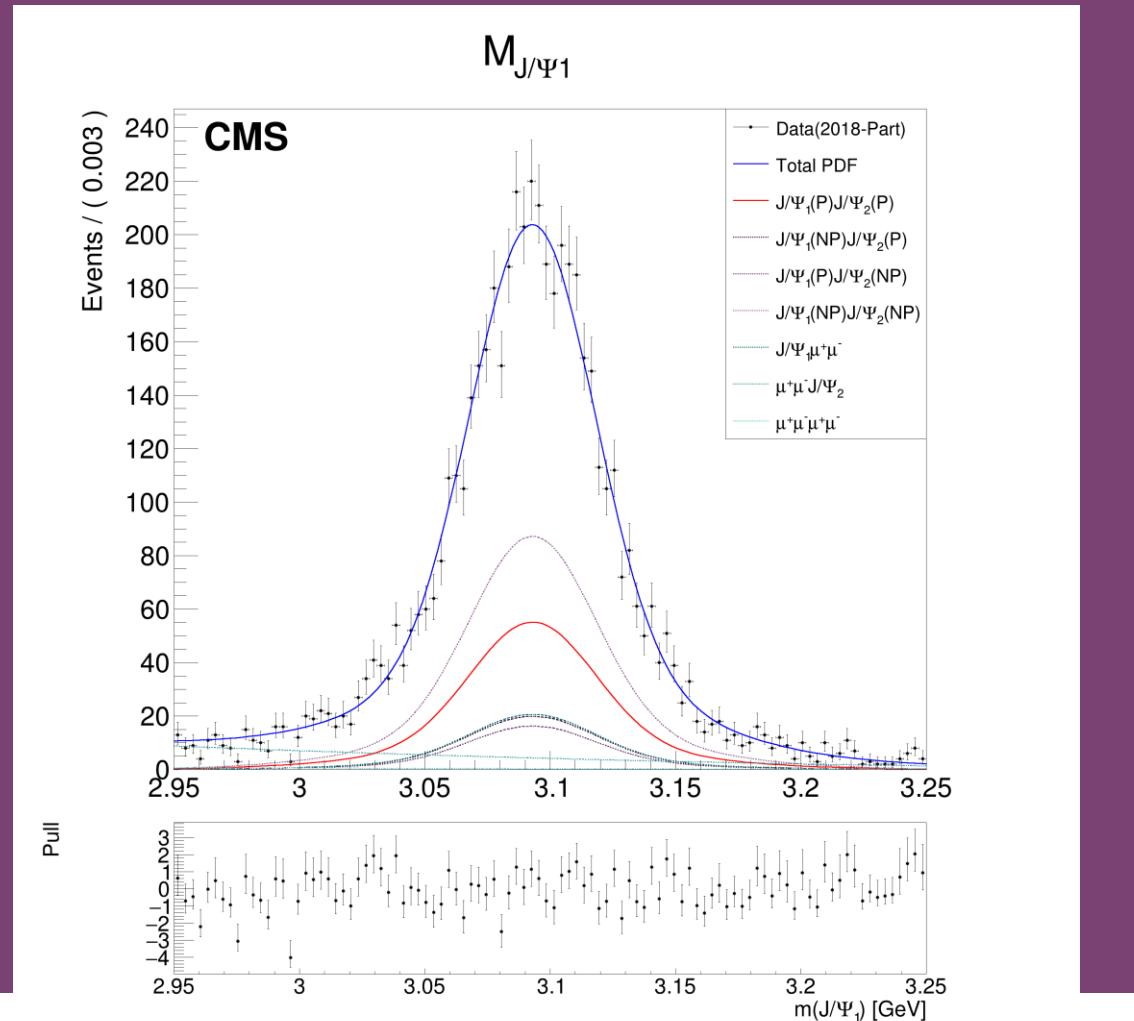


# Discussion about the fitting procedure



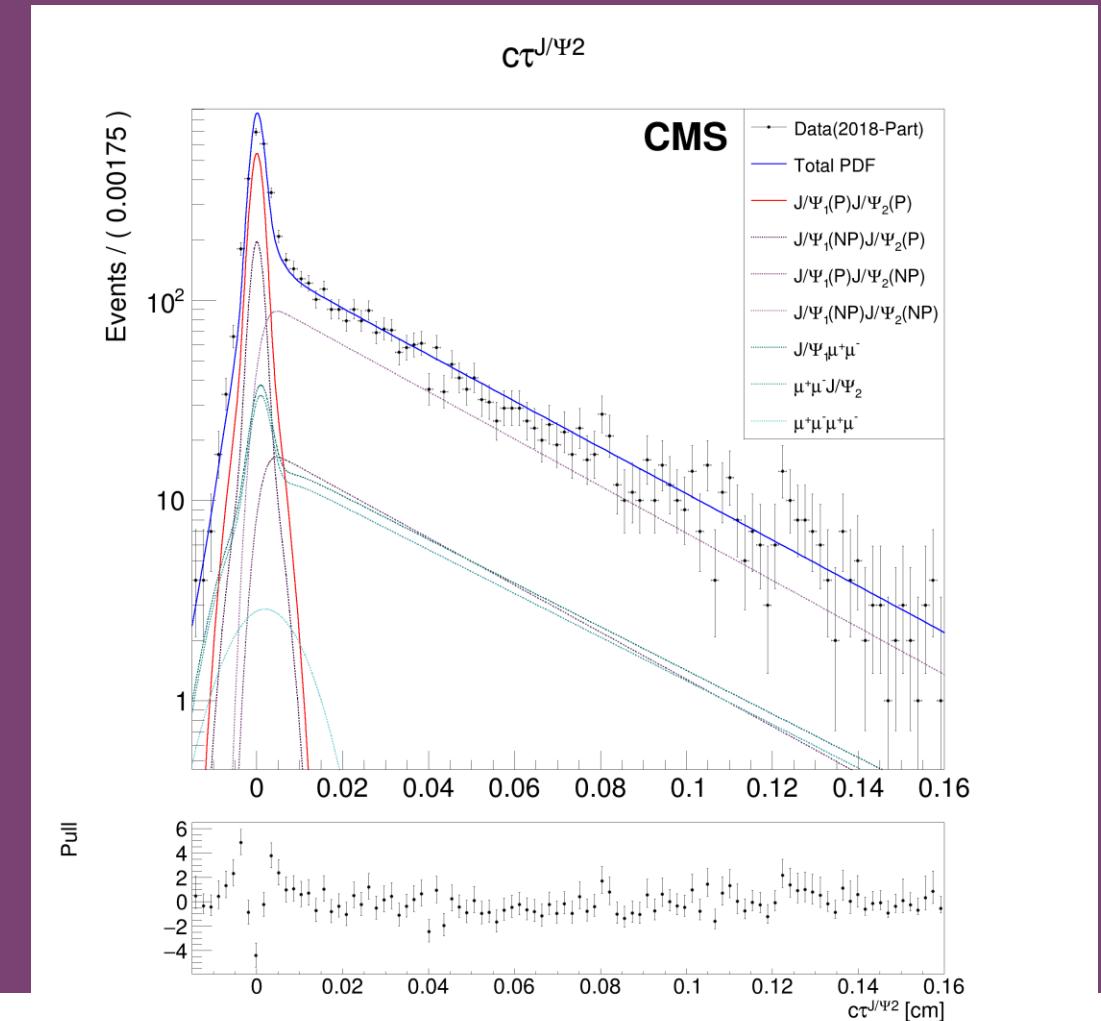
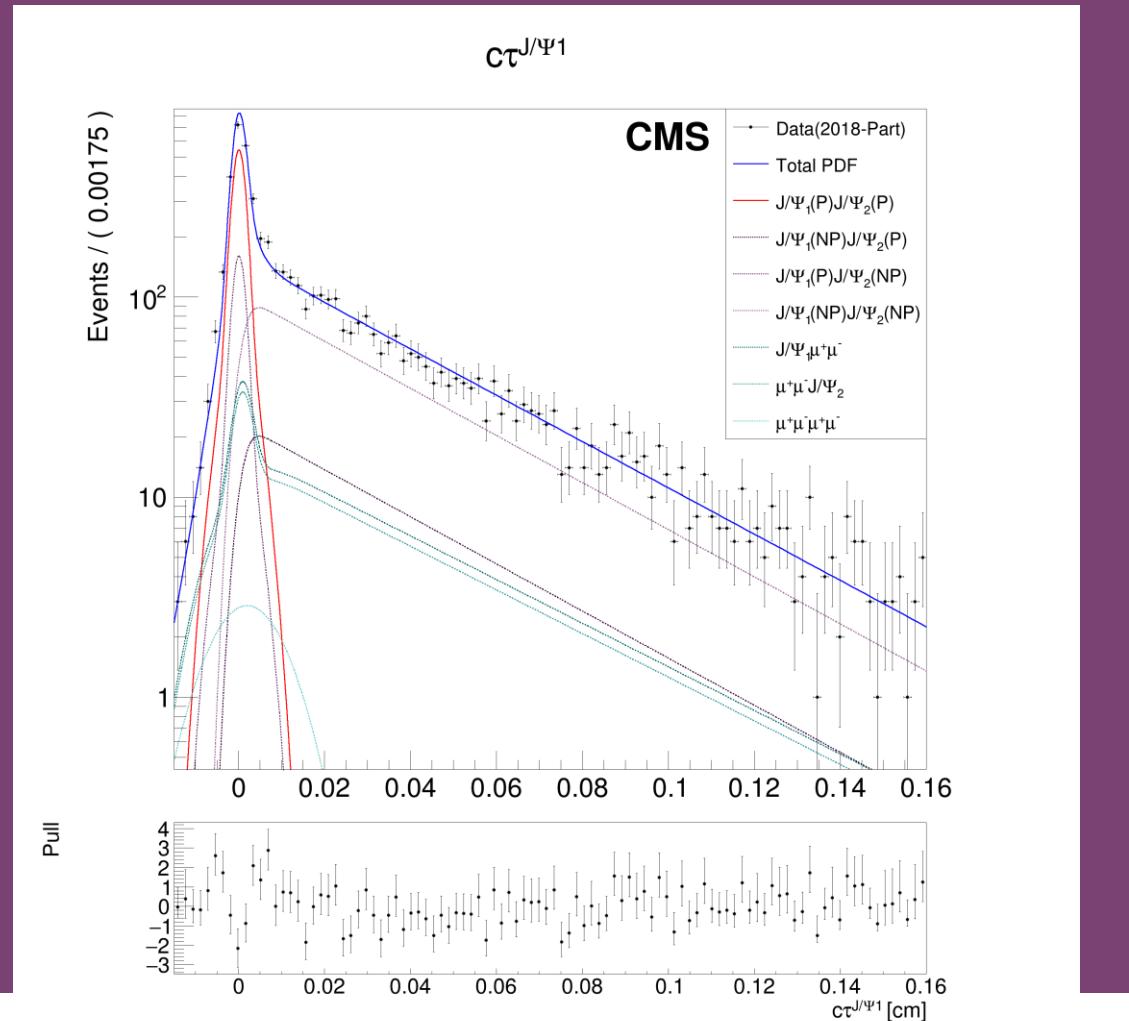


# Test of the fitting (2018 dataset - part)





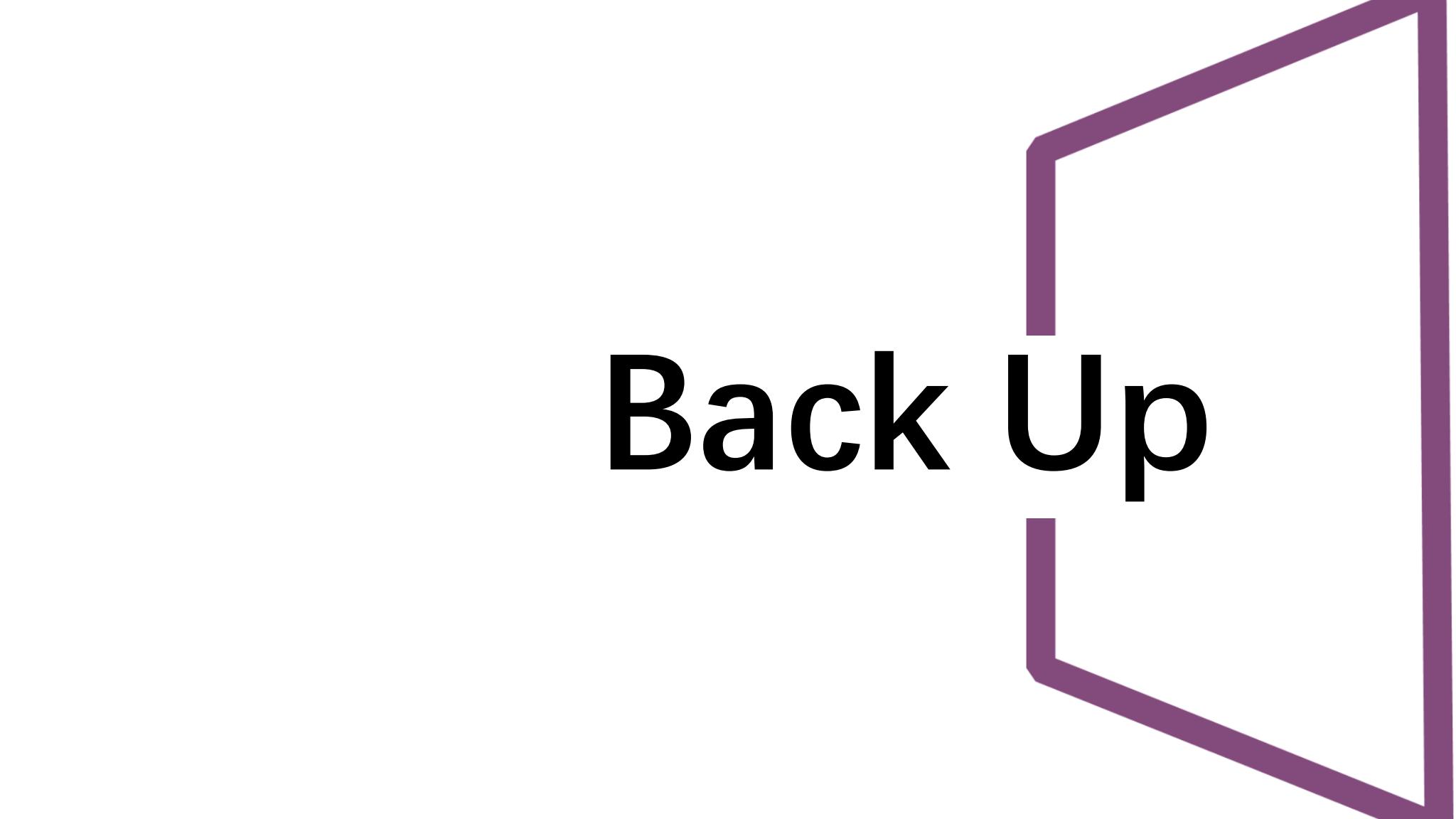
# Test of the fitting (2018 dataset – part )





# Result of the fitting

		2016	2018 – part
Luminosity ( $fb^{-1}$ )		<b>37.9</b>	<b>14.04</b>
$J/\psi_1 J/\psi_2$	P+P	<b><math>2630 \pm 60</math></b>	<b><math>1350 \pm 40</math></b>
	P+NP	<b><math>960 \pm 50</math></b>	<b><math>400 \pm 30</math></b>
	NP+P	<b><math>920 \pm 50</math></b>	<b><math>490 \pm 30</math></b>
	NP+NP	<b><math>5020 \pm 90</math></b>	<b><math>2140 \pm 70</math></b>
$J/\psi_1 \mu^+ \mu^-$		<b><math>410 \pm 40</math></b>	<b><math>510 \pm 50</math></b>
$\mu^+ \mu^- J/\psi_2$		<b><math>510 \pm 50</math></b>	<b><math>450 \pm 50</math></b>
$\mu^+ \mu^- \mu^+ \mu^-$		<b><math>26 \pm 14</math></b>	<b><math>36 \pm 15</math></b>

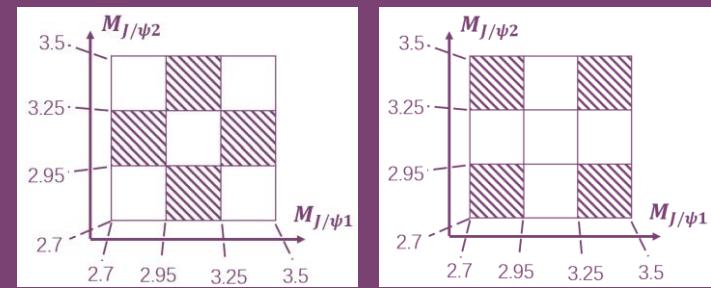


**Back Up**



# Fitting procedure

- Mix SPS and DPS samples into the prompt sample (8K:4K)
- 1D fit to the prompt sample on the  $c\tau_1$  dimension to acquire the **shape1** (double gaussian)
- 1D fit to the non-prompt sample on the  $c\tau_1$  dimension to acquire the **shape2** (convolution of an exponent and gaussian)
- 1D fit to the prompt sample on the  $M_{J/\psi 1}$  dimension to acquire the **shape3** (double CB)
- 1D fit to the data sample on the  $M_{J/\psi 1}$  dimension to acquire the **shape4** (second order Cheb, the fitting is applied with a merging of the float Cheb and the **shape3**)
- Side band cut to the data sample to acquire two combinatorial backgrounds ( $J/\psi \mu^+ \mu^-$ ,  $\mu^+ \mu^- \mu^+ \mu^-$ )
- 1D fit to the  $J/\psi \mu^+ \mu^-$  on the  $c\tau_1$  dimension to acquire the **shape5** (merging of a gaussian and a convolution)
- 1D fit to the  $\mu^+ \mu^- \mu^+ \mu^-$  on the  $c\tau_1$  dimension to acquire the **shape6** (gaussian)
- **Final fitting**





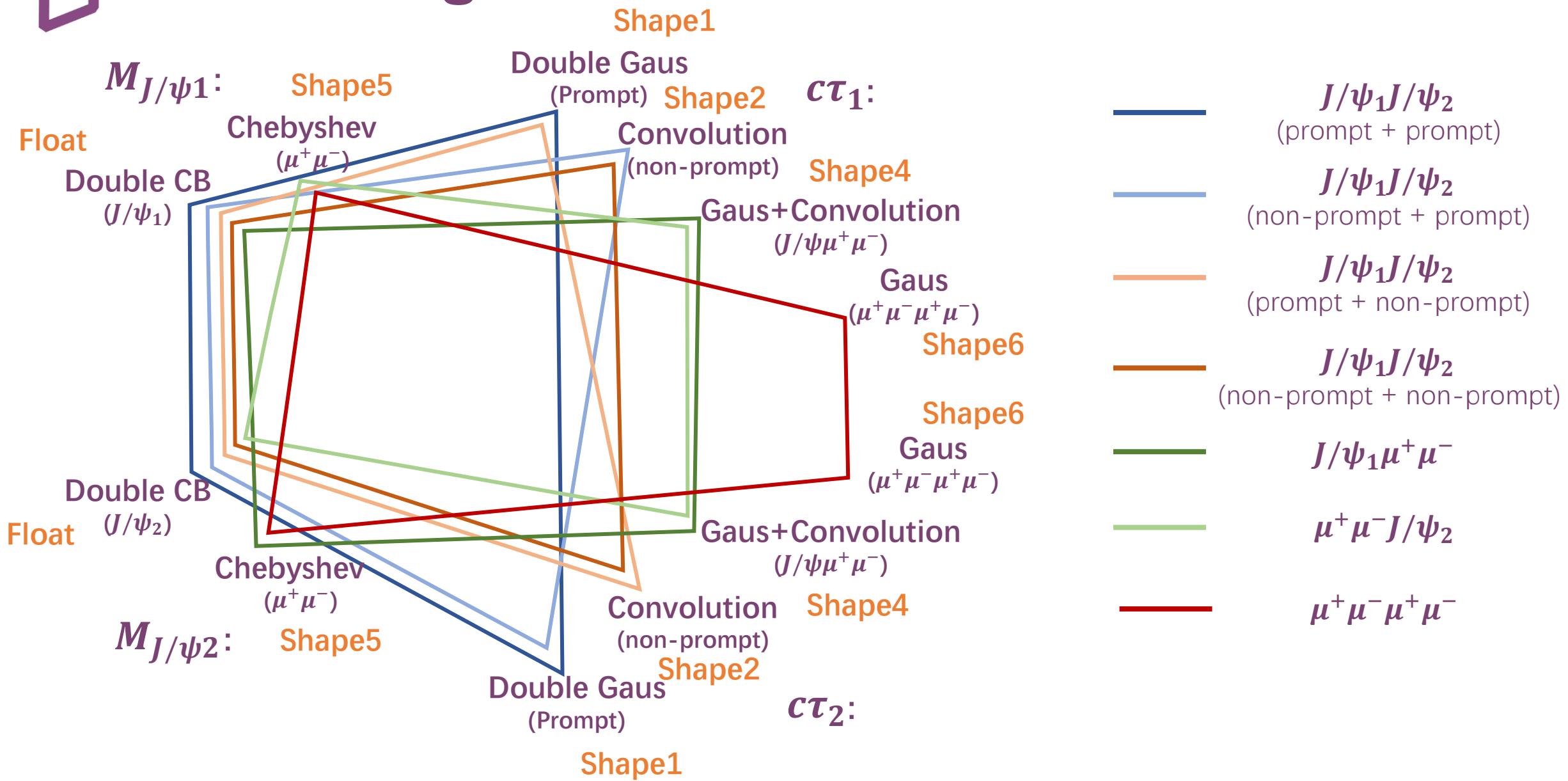
# Final fitting

Components	$M_{J/\psi 1}$	$M_{J/\psi 2}$	$c\tau_1$	$c\tau_2$
$J/\psi_1 J/\psi_2$	P+P	Double CB	Shape1	Shape1
	NP+P		Shape2	Shape1
	P+NP	Double CB	Shape1	Shape2
	NP+NP		Shape2	Shape2
$J/\psi_1 \mu^+ \mu^-$	Double CB	Shape4	Shape5	Shape5
$\mu^+ \mu^- J/\psi_2$	Shape4	Double CB		
$\mu^+ \mu^- \mu^+ \mu^-$	Shape4	Shape4	Shape6	Shape6

- The functions that share the same name listed in the table also share the same set of parameters (because of the smearing between two  $J/\psi$ s)
- The parameters for the shape1/2/3/5/6 are fixed from the previous fitting
- The parameters for the double CB are float

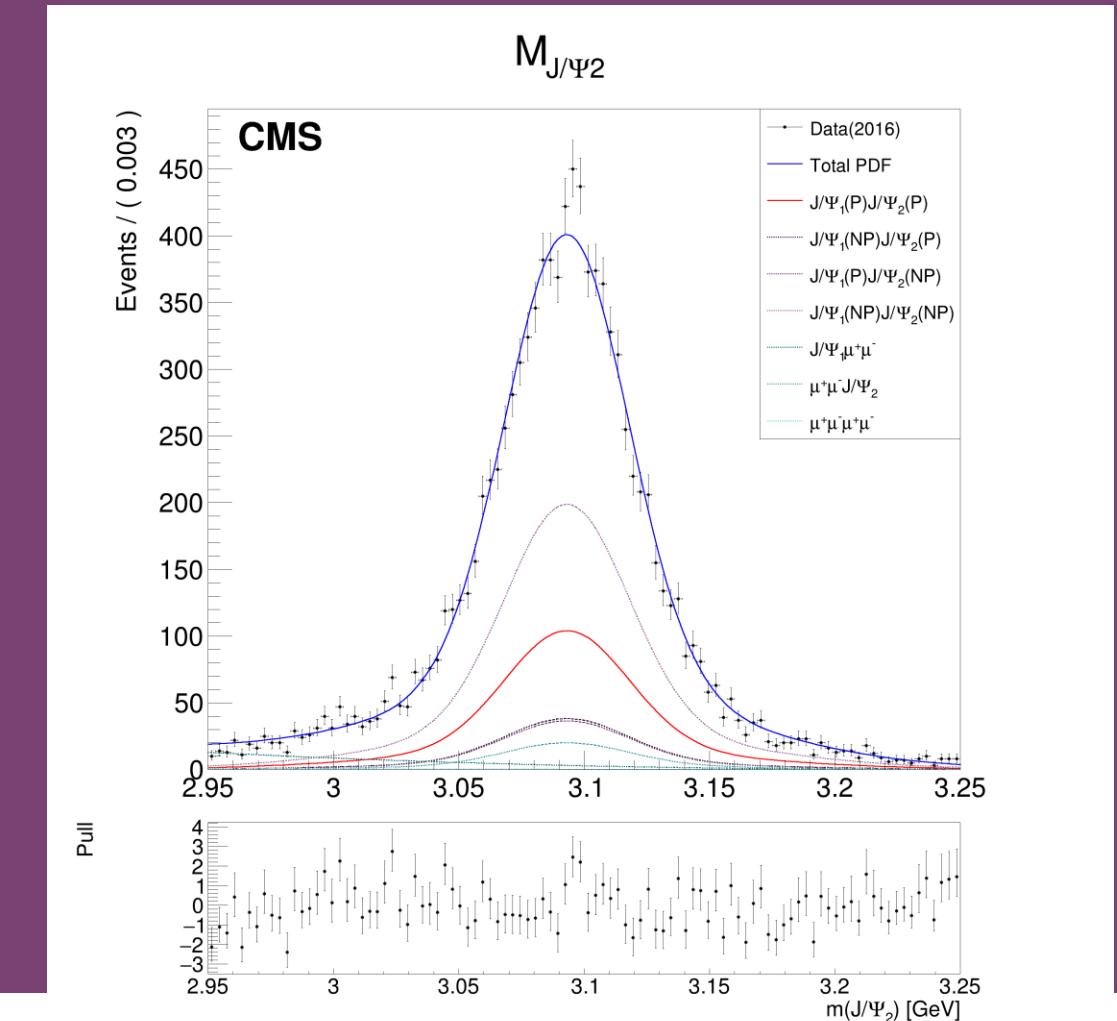
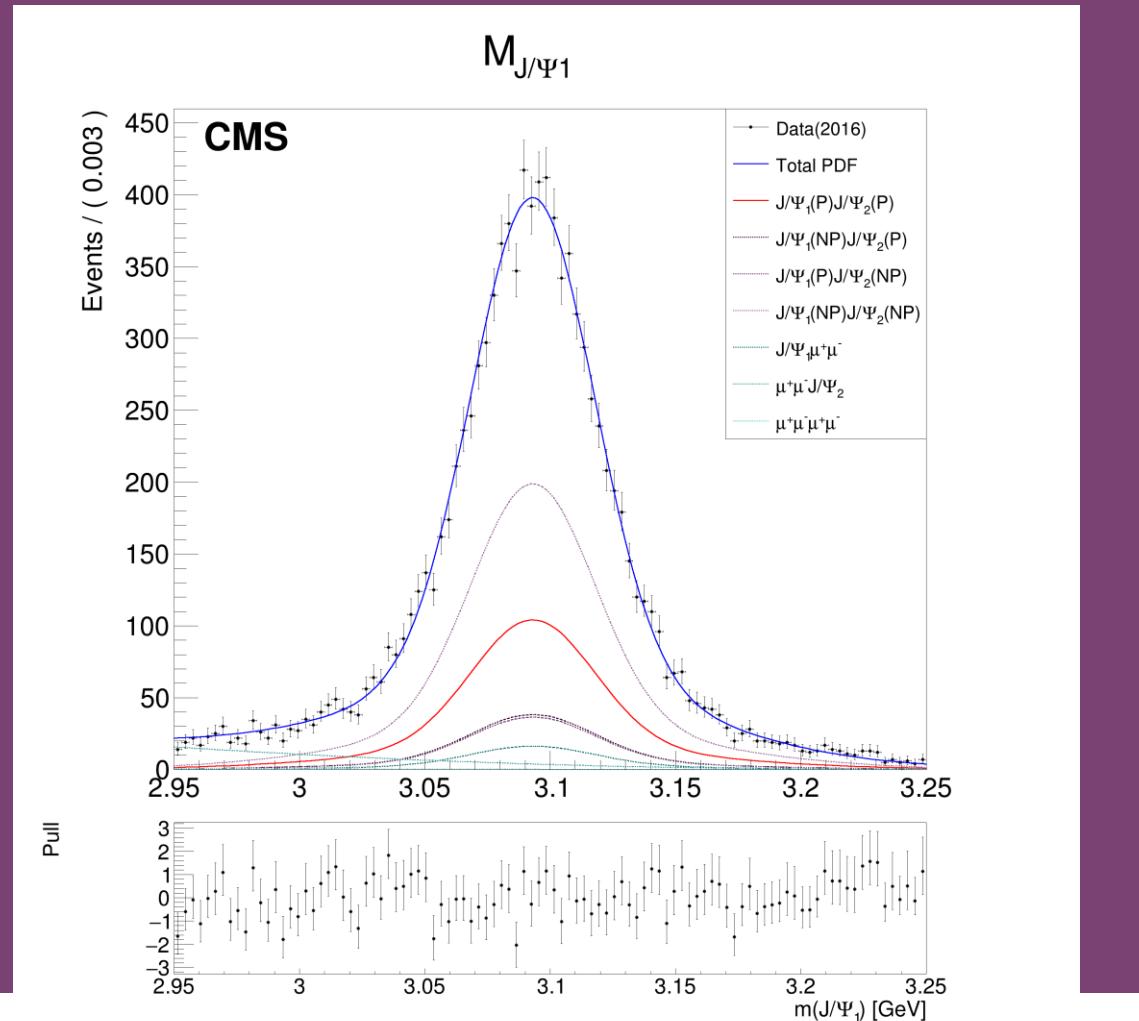


# Final fitting



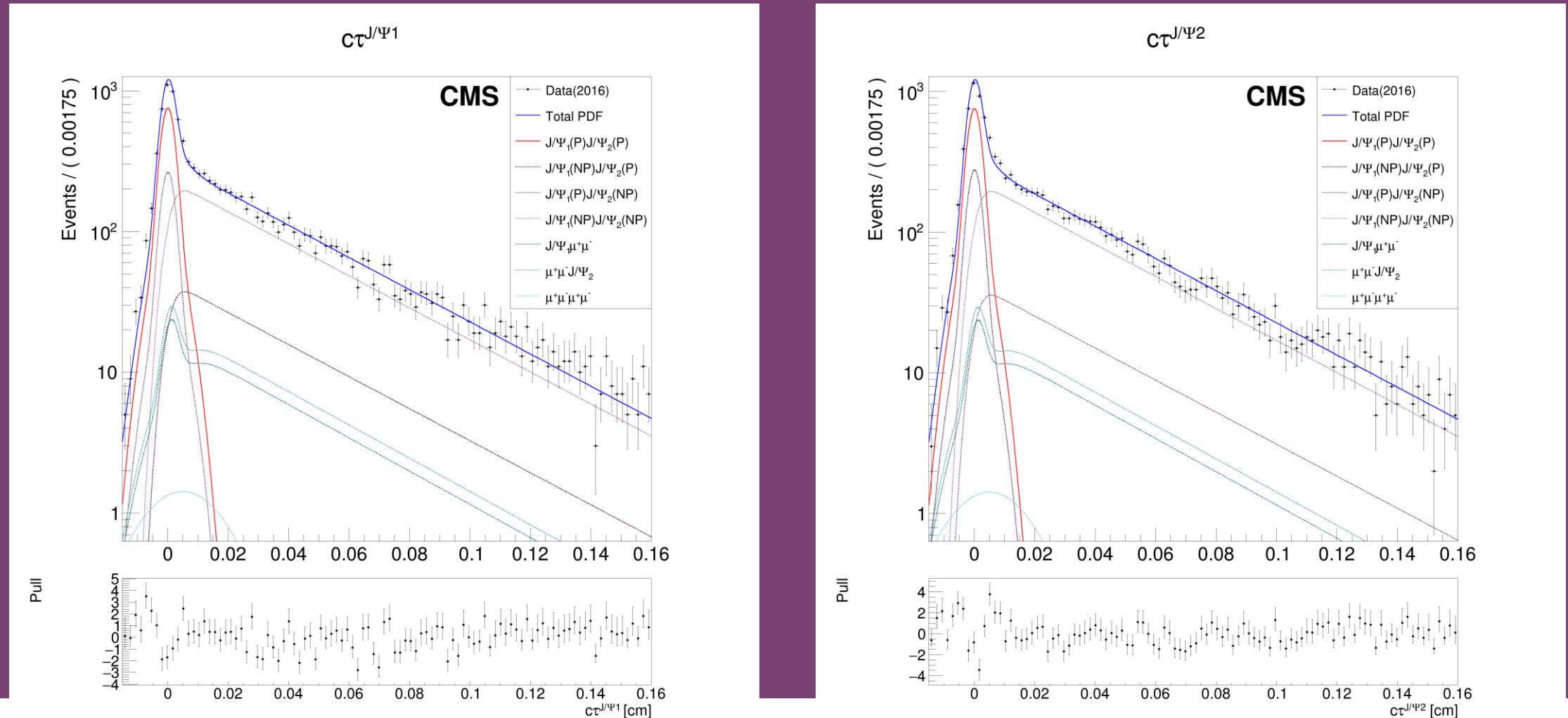
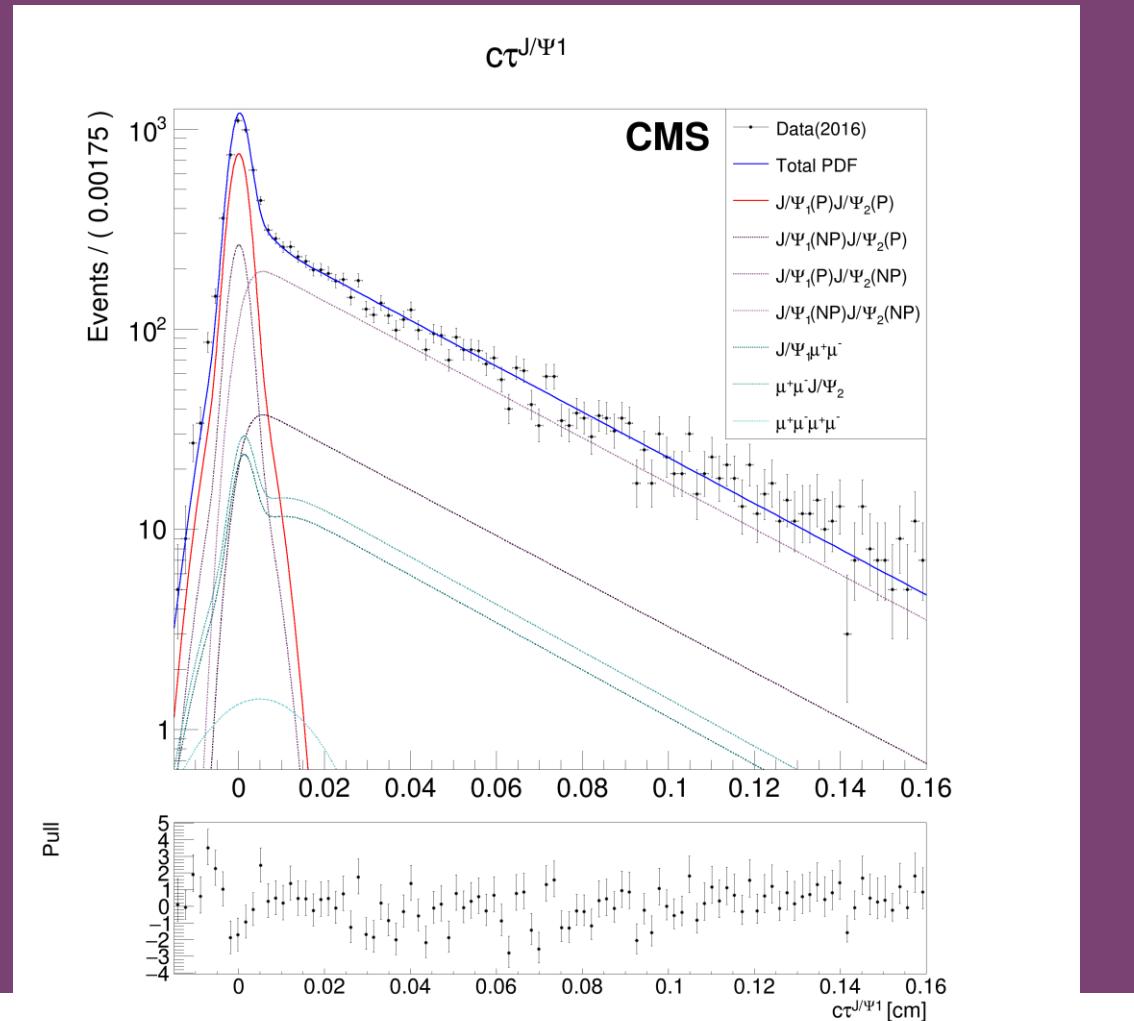


# Test of the fitting (2016 dataset)



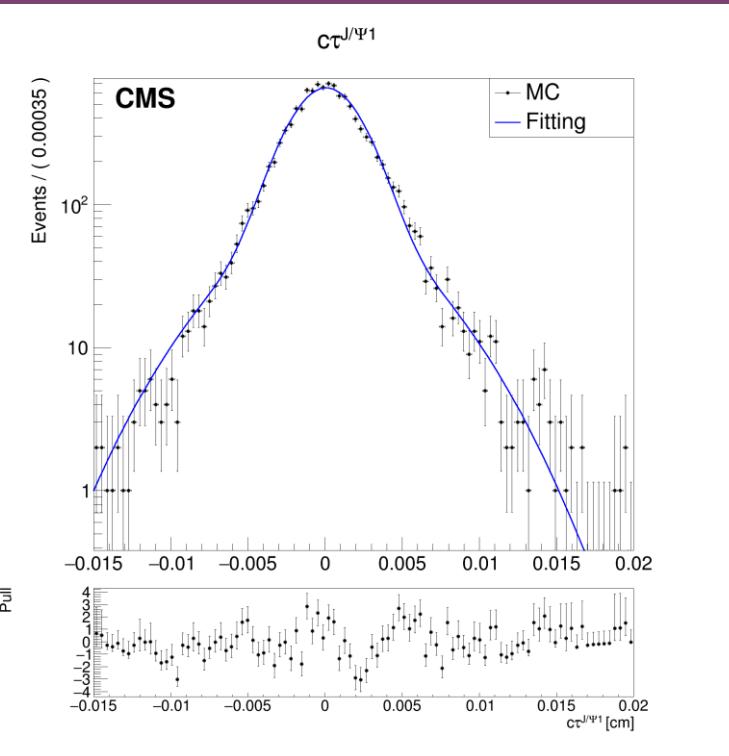


# Test of the fitting (2016 dataset)

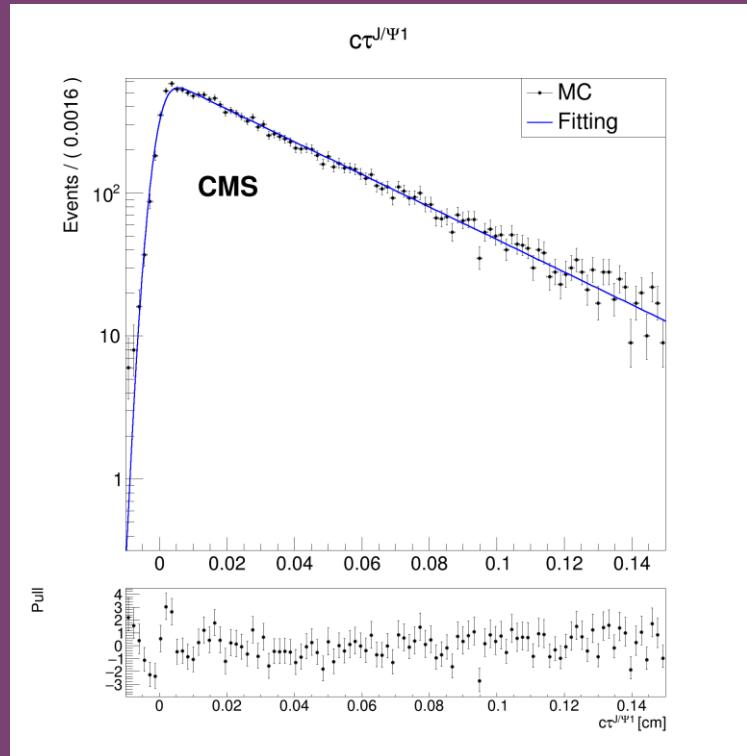




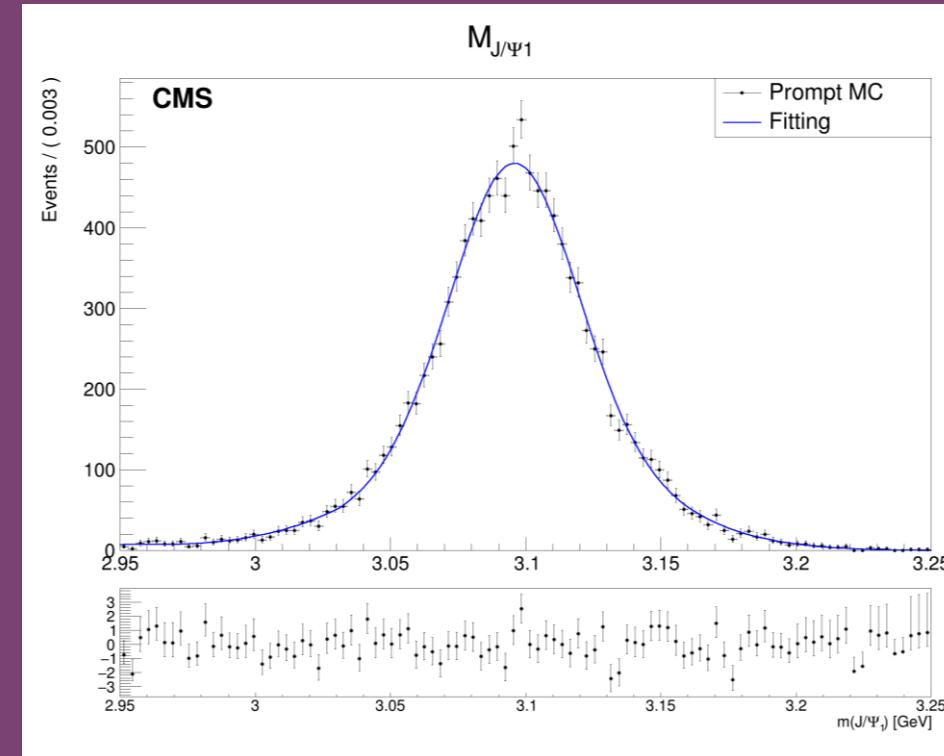
# The shapes (2016)



Shape1, the prompt MC on the  $c\tau_1$  dimension, double gaussian



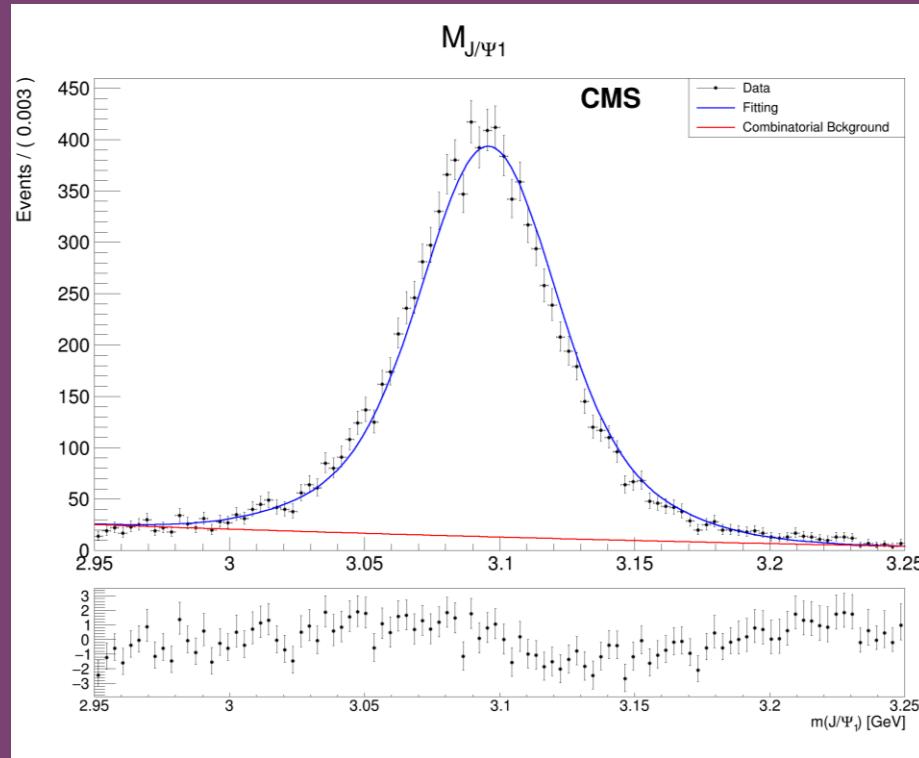
Shape2, the non-prompt MC on the  $c\tau_1$  dimension, convolution



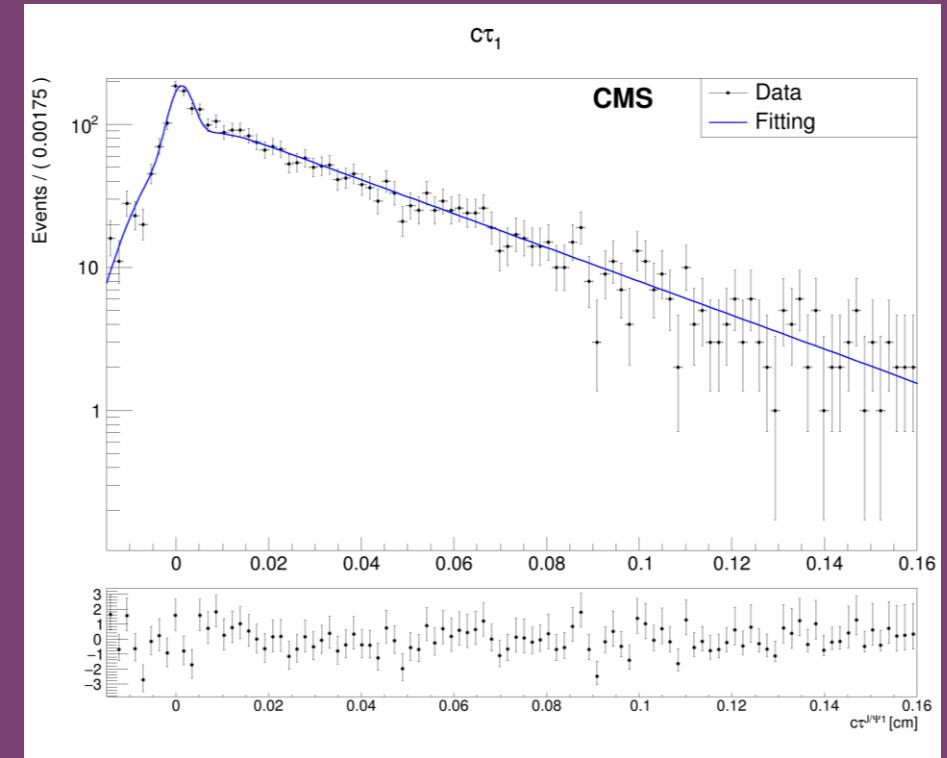
Shape3, the prompt MC on the  $M_{J/\Psi 1}$  dimension, double CB



# The shapes (2016)



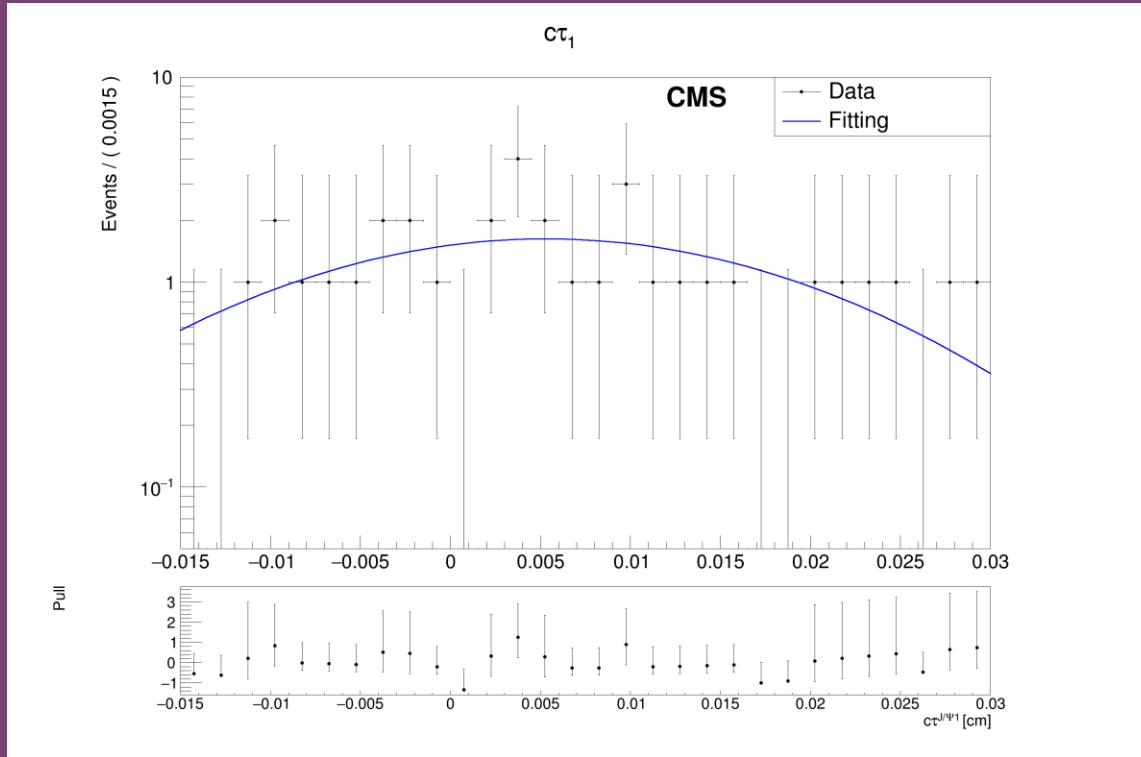
Shape4(red line), the data sample on the  $M_{J/\psi 1}$  dimension, second order Chebyshev



Shape5, the  $J/\psi \mu^+ \mu^-$  on the  $c\tau_1$  dimension, gaussian + convolution



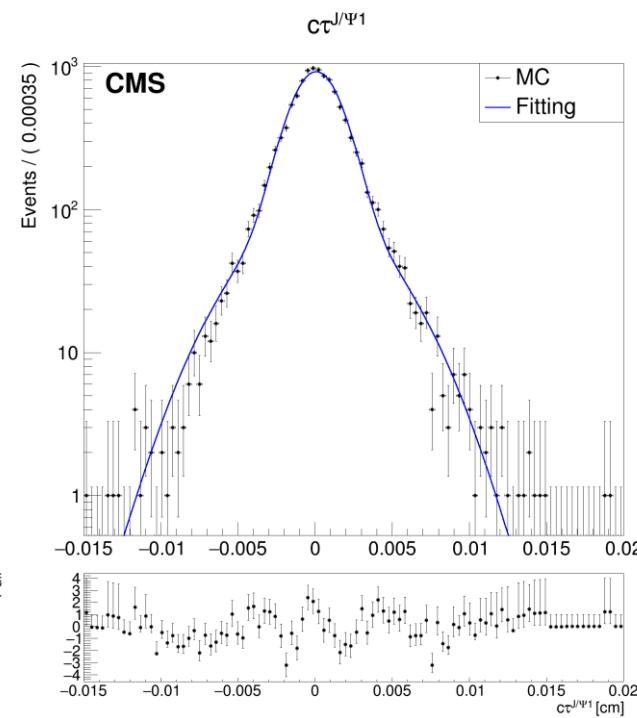
# The shapes (2016)



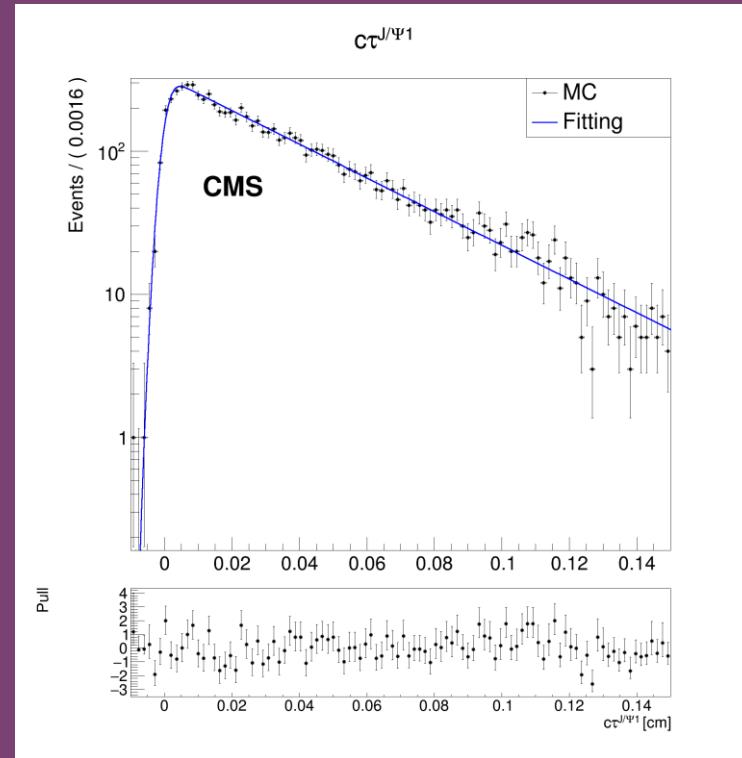
Shape6, the  $\mu^+\mu^- \mu^+\mu^-$  on the  $c\tau_1$   
dimension, gaussian  
(Plotting may get improved)



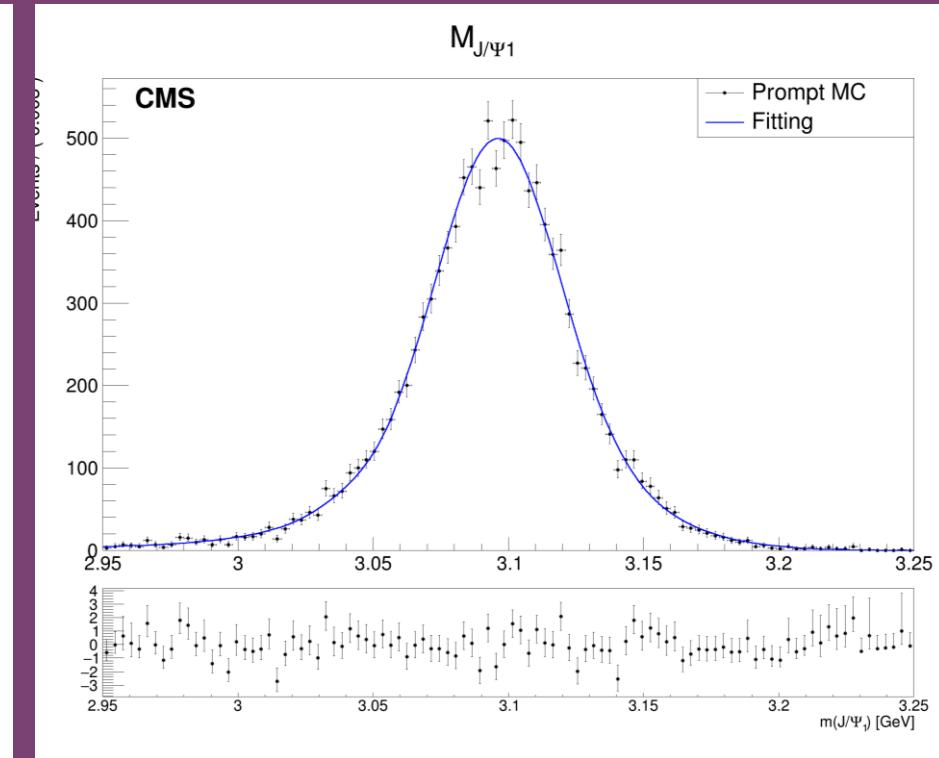
# The shapes (2018)



Shape1, the prompt MC on the  $c\tau_1$  dimension, double gaussian



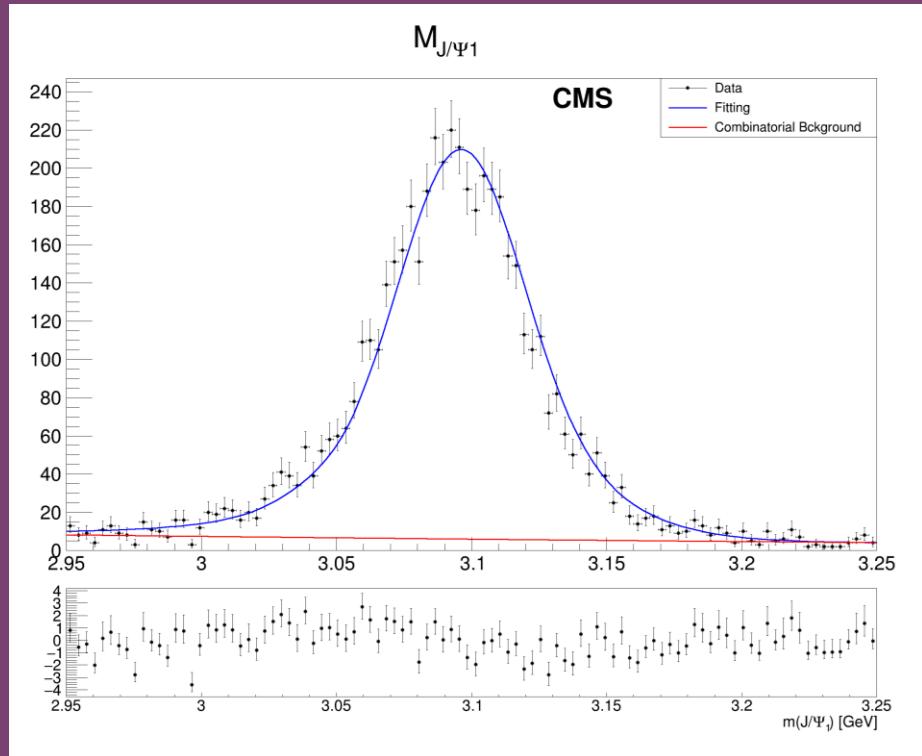
Shape2, the non-prompt MC on the  $c\tau_1$  dimension, convolution



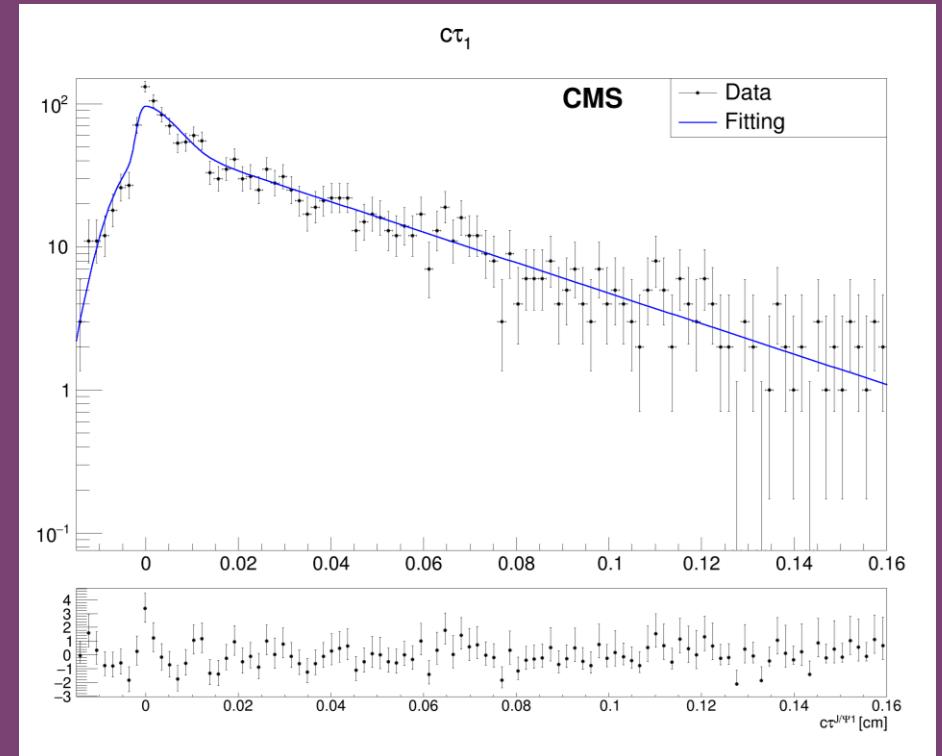
Shape3, the prompt MC on the  $M_{J/\psi 1}$  dimension, double CB



# The shapes (2018)



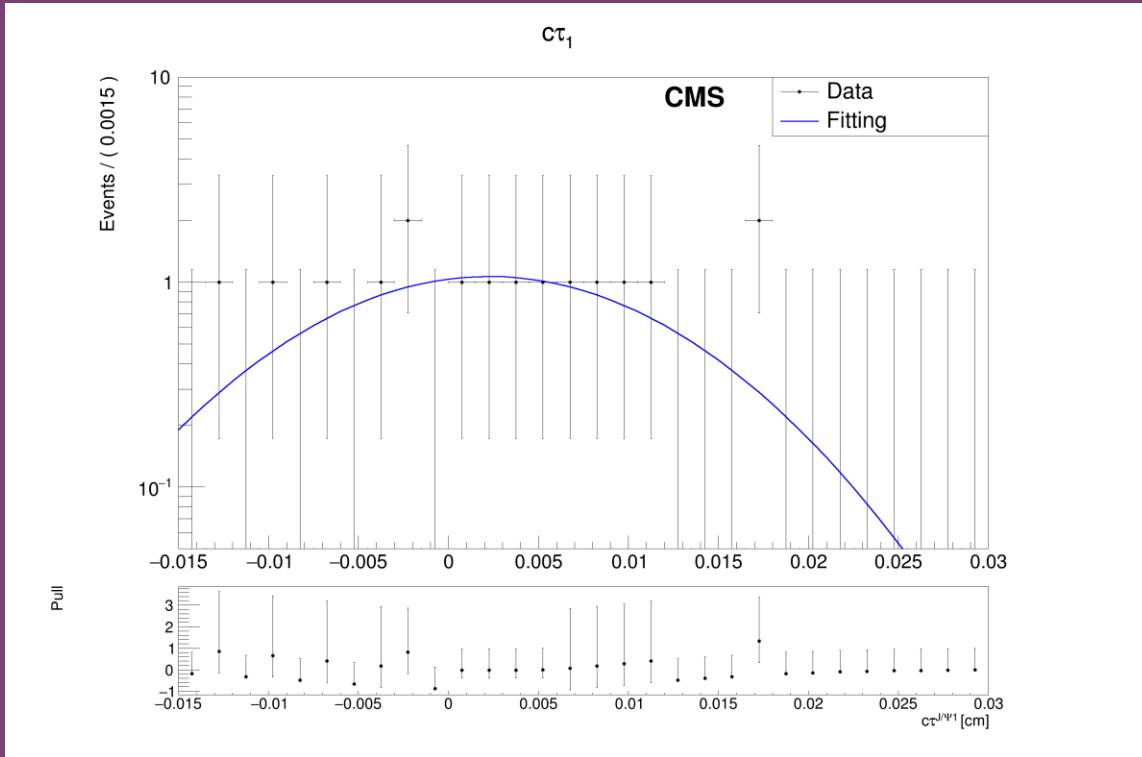
Shape4(red line), the data sample on the  $M_{J/\psi 1}$  dimension, second order Chebyshev



Shape5, the  $J/\psi \mu^+ \mu^-$  on the  $c\tau_1$  dimension, gaussian + convolution



# The shapes (2018)



Shape6, the  $\mu^+\mu^- \mu^+\mu^-$  on the  $c\tau_1$   
dimension, gaussian  
(Plotting may get improved)