

$$J/\psi \rightarrow e^+ e^-$$

# Background Study

Table 1: Decay trees and their respective initial-final states.

rowNo	decay tree (decay initial-final states)	iDcyTr	iDcyIFSts	nEtr	nCEtr
1	$\psi' \rightarrow \pi^+ \pi^- J/\psi, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^- \pi^+ \pi^-$ )	0	0	873829	873829
2	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow \pi^+ \pi^-, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^- \pi^+ \pi^-$ )	1	0	247	874076
3	$\psi' \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^-$ )	2	1	91	874167
4	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow \pi^0 \pi^+ \pi^-, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^- \pi^0 \pi^+ \pi^-$ )	4	3	58	874225
5	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow e^+ e^-, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^+ e^- e^-$ )	3	2	36	874261
6	$\psi' \rightarrow \pi^0 J/\psi, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^- \pi^0$ )	9	8	7	874268
7	$\psi' \rightarrow \pi^0 \pi^0 J/\psi, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^- \pi^0 \pi^0$ )	7	6	6	874274
8	$\psi' \rightarrow \pi^0 \pi^0 J/\psi, \pi^0 \rightarrow e^+ e^-, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^+ e^- e^- \pi^0$ )	5	4	4	874278
9	$\psi' \rightarrow \pi^+ \pi^- J/\psi, J/\psi \rightarrow \pi^+ \pi^-$ ( $\psi' \rightarrow \pi^+ \pi^+ \pi^- \pi^-$ )	6	5	4	874282
10	$\psi' \rightarrow \pi^0 J/\psi, \pi^0 \rightarrow e^+ e^-, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^+ e^- e^-$ )	11	2	4	874286
11	$\psi' \rightarrow \chi_{c2} \gamma, \chi_{c2} \rightarrow J/\psi \gamma, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^- \gamma \gamma$ )	8	7	3	874289
12	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow \mu^+ \mu^-, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^- \mu^+ \mu^-$ )	17	15	2	874291
13	$\psi' \rightarrow \pi^- \bar{K}^+ K^+, \bar{K}^+ \rightarrow \pi^+ K^-$ ( $\psi' \rightarrow \pi^+ \pi^- K^+ K^-$ )	12	10	1	874292
14	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow \pi^0 \pi^+ \pi^-, J/\psi \rightarrow e^+ e^-, \pi^0 \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^+ e^- e^- \pi^+ \pi^-$ )	13	11	1	874293
15	$\psi' \rightarrow \pi^0 \pi^0 J/\psi, \pi^0 \rightarrow e^+ e^-, \pi^0 \rightarrow e^+ e^-, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^+ e^+ e^- e^- e^-$ )	14	12	1	874294
16	$\psi' \rightarrow \chi_{c1} \gamma, \chi_{c1} \rightarrow \pi^- b_1^0 b_1^+, b_1^0 \rightarrow \pi^0 \omega, b_1^+ \rightarrow \pi^+ \omega, \omega \rightarrow \pi^0 \pi^+ \pi^-, \omega \rightarrow \pi^0 \pi^+ \pi^-$ ( $\psi' \rightarrow \pi^0 \pi^0 \pi^0 \pi^+ \pi^+ \pi^- \pi^- \pi^- \gamma$ )	15	13	1	874295
17	$\psi' \rightarrow \pi^0 \pi^0 J/\psi, J/\psi \rightarrow \pi^0 \omega, \omega \rightarrow \pi^0 \pi^+ \pi^-$ ( $\psi' \rightarrow \pi^0 \pi^0 \pi^0 \pi^0 \pi^+ \pi^-$ )	16	14	1	874296

99.9%

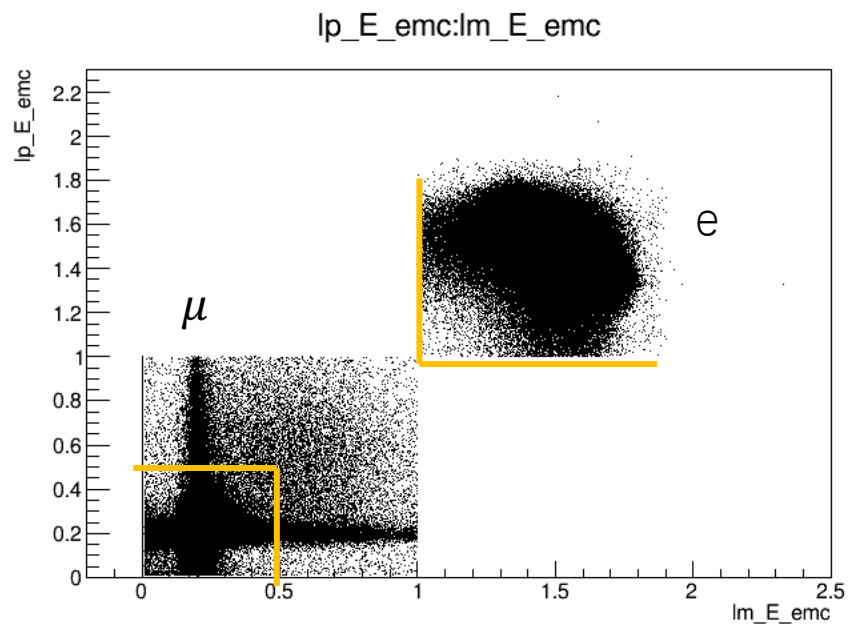
$$J/\psi \rightarrow \mu^+ \mu^-$$

# Background Study

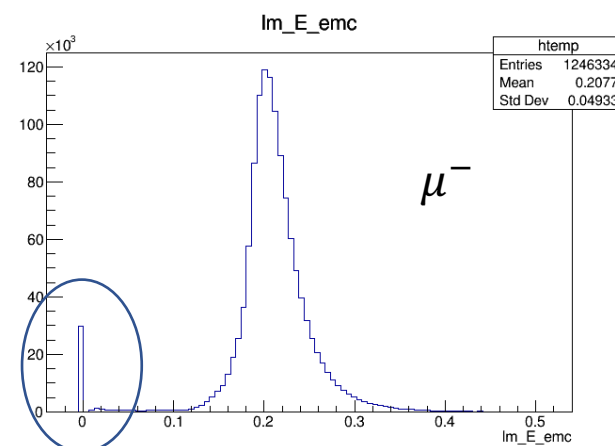
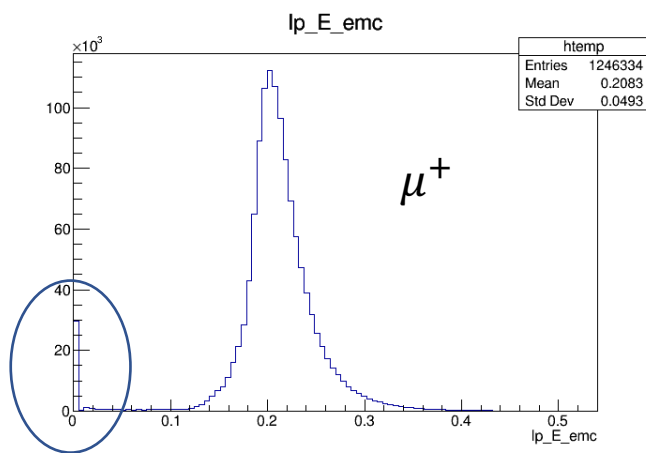
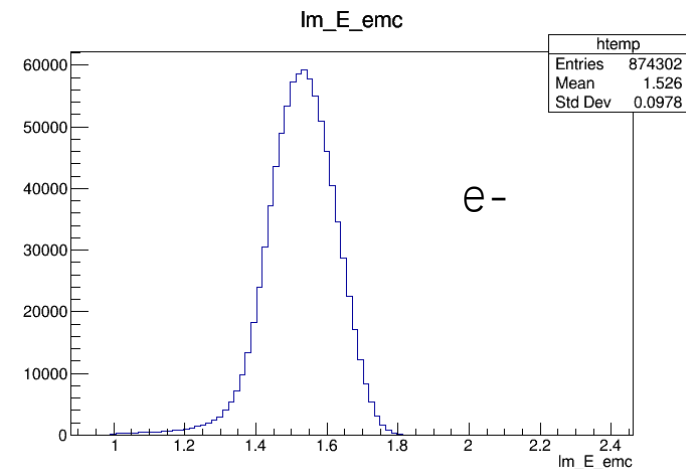
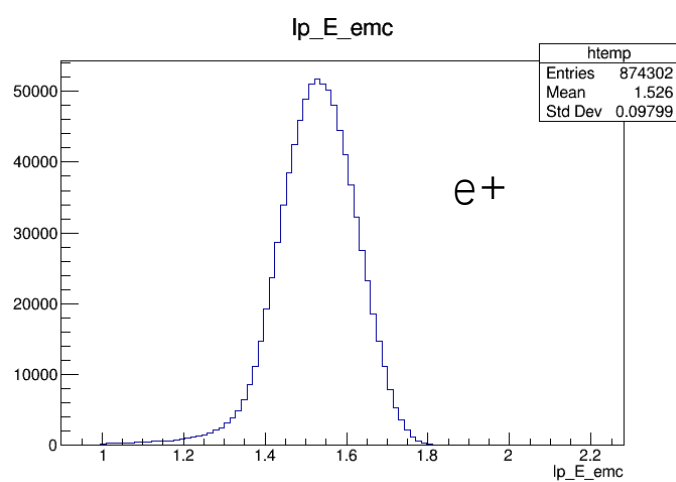
Table 1: Decay trees and their respective initial-final states.

rowNo	decay tree (decay initial-final states)	iDcyTr	iDcyIFSts	nEtr	nCEtr
1	$\psi' \rightarrow \pi^+\pi^- J/\psi, J/\psi \rightarrow \mu^+\mu^-$ ( $\psi' \rightarrow \mu^+\mu^-\pi^+\pi^-$ )	0	0	1241635	1241635
2	$\psi' \rightarrow \pi^+\pi^- J/\psi, J/\psi \rightarrow e^+e^-$ ( $\psi' \rightarrow e^+e^-\pi^+\pi^-$ )	1	1	2367	1244002
3	$\psi' \rightarrow \pi^+\pi^- J/\psi, J/\psi \rightarrow \pi^+\pi^-$ ( $\psi' \rightarrow \pi^+\pi^+\pi^-\pi^-$ )	3	2	1462	1245464
4	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow \pi^+\pi^-, J/\psi \rightarrow \mu^+\mu^-$ ( $\psi' \rightarrow \mu^+\mu^-\pi^+\pi^-$ )	8	0	408	1245872
5	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow \pi^0\pi^+\pi^-, J/\psi \rightarrow \mu^+\mu^-$ ( $\psi' \rightarrow \mu^+\mu^-\pi^0\pi^+\pi^-$ )	12	8	83	1245955
6	$\psi' \rightarrow \rho^0\pi^+\pi^-, \rho^0 \rightarrow \pi^+\pi^-$ ( $\psi' \rightarrow \pi^+\pi^+\pi^-\pi^-$ )	2	2	72	1246027
7	$\psi' \rightarrow \pi^+\pi^- J/\psi, J/\psi \rightarrow f_0(2100)\gamma, f_0(2100) \rightarrow \pi^+\pi^-$ ( $\psi' \rightarrow \pi^+\pi^+\pi^-\pi^-\gamma$ )	6	5	59	1246086
8	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow e^+e^-, J/\psi \rightarrow \mu^+\mu^-$ ( $\psi' \rightarrow e^+e^-\mu^+\mu^-$ )	13	4	32	1246118
9	$\psi' \rightarrow \mu^+\mu^-$ ( $\psi' \rightarrow \mu^+\mu^-$ )	7	6	29	1246147
10	$\psi' \rightarrow \pi^+\pi^- J/\psi, J/\psi \rightarrow f_4(2050)\gamma, f_4(2050) \rightarrow \pi^+\pi^-$ ( $\psi' \rightarrow \pi^+\pi^+\pi^-\pi^-\gamma$ )	18	5	28	1246175
11	$\psi' \rightarrow \pi^0\pi^0 J/\psi, J/\psi \rightarrow \mu^+\mu^-$ ( $\psi' \rightarrow \mu^+\mu^-\pi^0\pi^0$ )	4	3	16	1246191
12	$\psi' \rightarrow \pi^0 J/\psi, \pi^0 \rightarrow e^+e^-, J/\psi \rightarrow \mu^+\mu^-$ ( $\psi' \rightarrow e^+e^-\mu^+\mu^-$ )	5	4	9	1246200
13	$\psi' \rightarrow \pi^+\pi^- J/\psi, J/\psi \rightarrow K^+K^-$ ( $\psi' \rightarrow \pi^+\pi^-K^+K^-$ )	14	7	8	1246208
14	$\psi' \rightarrow K^-K_1^+, K_1^+ \rightarrow \pi^+K_0^0, K_0^0 \rightarrow \pi^-K^+$ ( $\psi' \rightarrow \pi^+\pi^-K^+K^-$ )	24	7	7	1246215
15	$\psi' \rightarrow \pi^+\pi^+\pi^-\pi^-$ ( $\psi' \rightarrow \pi^+\pi^+\pi^-\pi^-$ )	19	2	6	1246221
16	$\psi' \rightarrow \pi^0 J/\psi, J/\psi \rightarrow \mu^+\mu^-$ ( $\psi' \rightarrow \mu^+\mu^-\pi^0$ )	26	14	6	1246227
17	$\psi' \rightarrow \pi^-b_1^+, b_1^+ \rightarrow \pi^+\omega, \omega \rightarrow \pi^+\pi^-$ ( $\psi' \rightarrow \pi^+\pi^+\pi^-\pi^-$ )	16	2	5	1246232

99.4%



Emc 沉积能量区分ee和mumu



解决方法：限制costheta

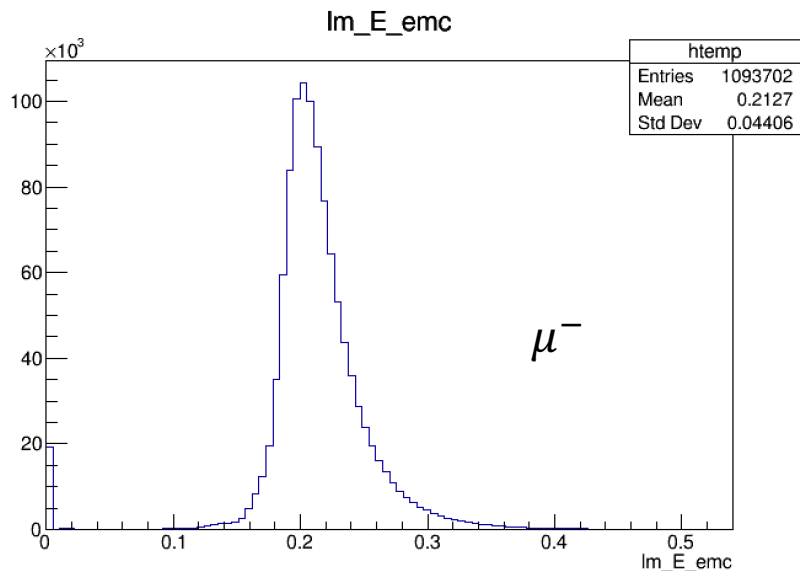
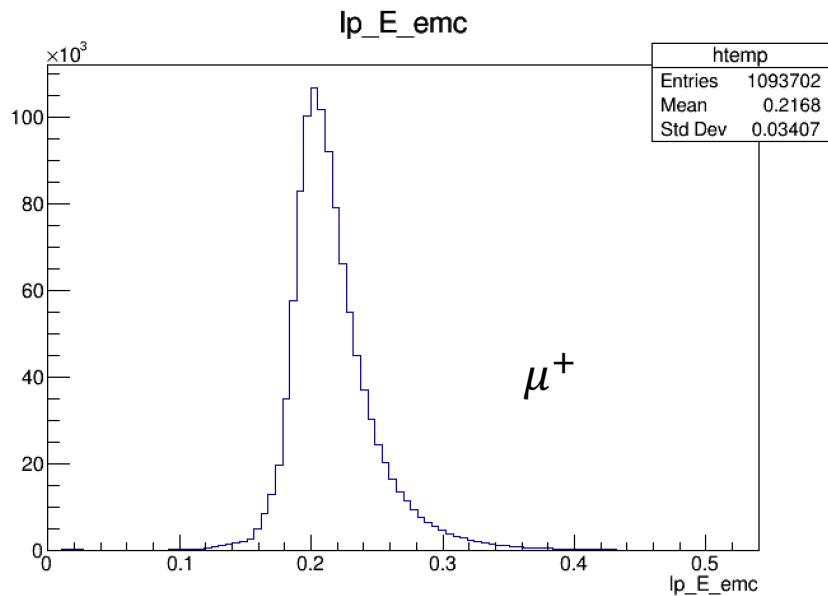


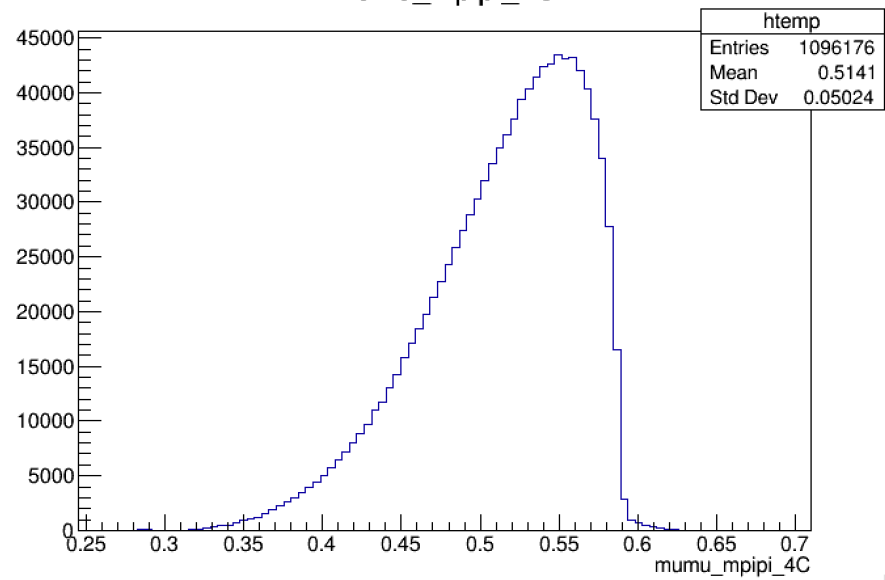
Table 1: Decay trees and their respective initial-final states.

rowNo	decay tree (decay initial-final states)	iDcyTr	iDcyIFSts	nEtr	nCEtr
1	$\psi' \rightarrow \pi^+ \pi^- J/\psi, J/\psi \rightarrow \mu^+ \mu^-$ ( $\psi' \rightarrow \mu^+ \mu^- \pi^+ \pi^-$ )	0	0	1094002	1094002
2	$\psi' \rightarrow \pi^+ \pi^- J/\psi, J/\psi \rightarrow \pi^+ \pi^-$ ( $\psi' \rightarrow \pi^+ \pi^+ \pi^- \pi^-$ )	4	1	1361	1095363
3	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow \pi^+ \pi^-, J/\psi \rightarrow \mu^+ \mu^-$ ( $\psi' \rightarrow \mu^+ \mu^- \pi^+ \pi^-$ )	5	0	376	1095739
4	$\psi' \rightarrow \pi^+ \pi^- J/\psi, J/\psi \rightarrow e^+ e^-$ ( $\psi' \rightarrow e^+ e^- \pi^+ \pi^-$ )	6	4	69	1095808
5	$\psi' \rightarrow \rho^0 \pi^+ \pi^-, \rho^0 \rightarrow \pi^+ \pi^-$ ( $\psi' \rightarrow \pi^+ \pi^+ \pi^- \pi^-$ )	1	1	61	1095869
6	$\psi' \rightarrow \pi^+ \pi^- J/\psi, J/\psi \rightarrow f_0(2100) \gamma, f_0(2100) \rightarrow \pi^+ \pi^-$ ( $\psi' \rightarrow \pi^+ \pi^+ \pi^- \pi^- \gamma$ )	3	3	51	1095920
7	$\psi' \rightarrow \pi^+ \pi^- J/\psi, J/\psi \rightarrow K^+ K^-$ ( $\psi' \rightarrow \pi^+ \pi^+ \pi^- K^+ K^-$ )	11	5	35	1095955
8	$\psi' \rightarrow \mu^+ \mu^-$ ( $\psi' \rightarrow \mu^+ \mu^-$ )	13	6	34	1095989
9	$\psi' \rightarrow \eta J/\psi, \eta \rightarrow e^+ e^-, J/\psi \rightarrow \mu^+ \mu^-$ ( $\psi' \rightarrow e^+ e^- \mu^+ \mu^-$ )	10	2	31	1096020
10	$\psi' \rightarrow \pi^+ \pi^- J/\psi, J/\psi \rightarrow f_4(2050) \gamma, f_4(2050) \rightarrow \pi^+ \pi^-$ ( $\psi' \rightarrow \pi^+ \pi^+ \pi^- \pi^- \gamma$ )	17	3	23	1096043

99.8%

增加桶和盖的costheta限制

mumu\_mpi\_4C



fdc-pwa

## The Phenomenology Lagrangian Model for $J/\Psi$ Physics

Input files: [model.def](#) [add vertices](#)

In the FDC environment, To run: "gmodel", The effective interaction model is generated.

Output files are "model.tex" which can be view by user and files of internal versioin of the model for FDC-PWA:

[Generated http Version of then model by running "latex2html model.tex"](#)

[Internal version of model for FDC: system/model](#)

[Internal version of Feynman rules for FDC: system/Feynman rules](#)