Collins Effect Update

A Lot More 7GeV MC @STCF

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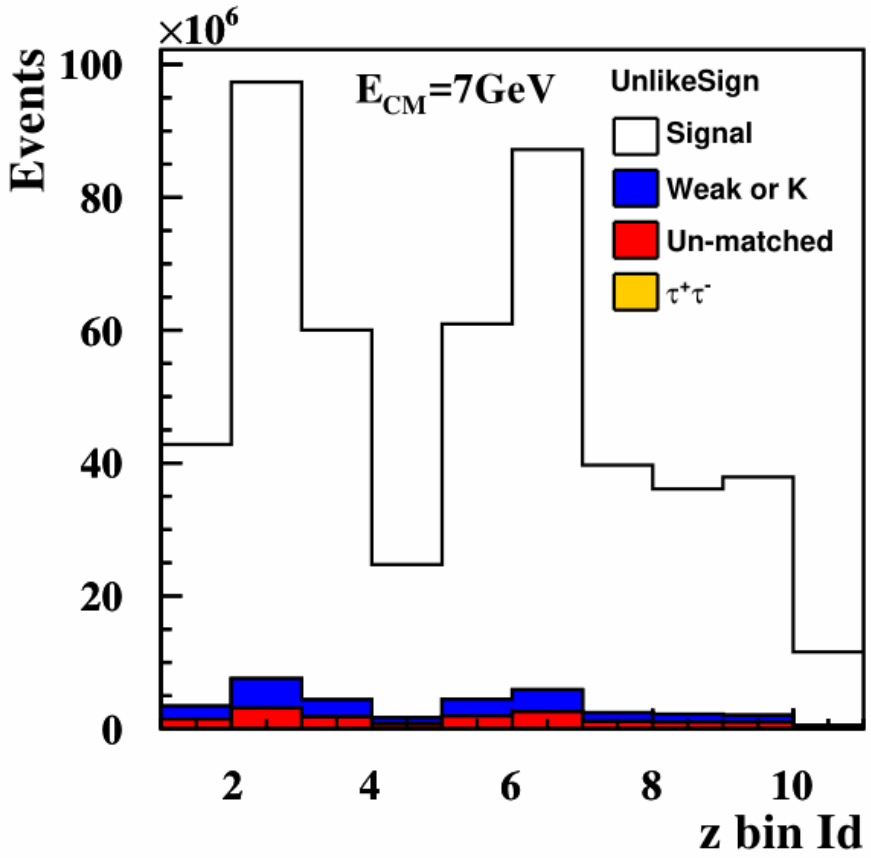
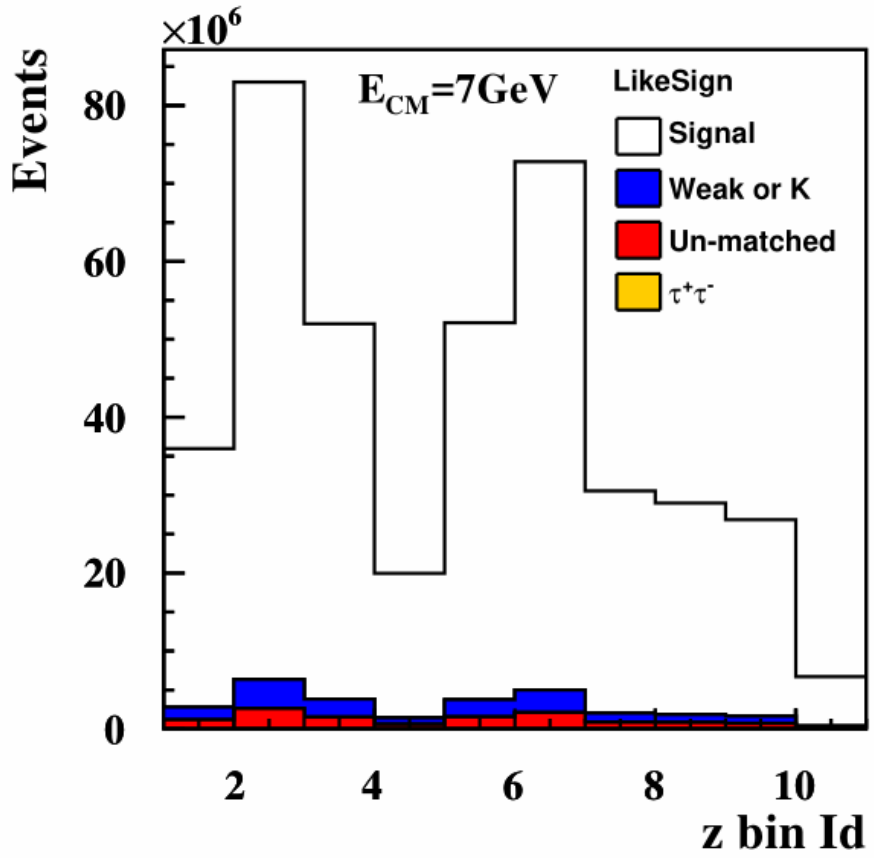
20191010

Pipi


×10^6
Events
100
80
60
40
20
0
E_CM=7GeV
UnlikeSign
Signal
Weak or K
Un-matched
τ+τ-
2
4
6
8
10
z bin Id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Events
80
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LikeSign
Signal
Weak or K
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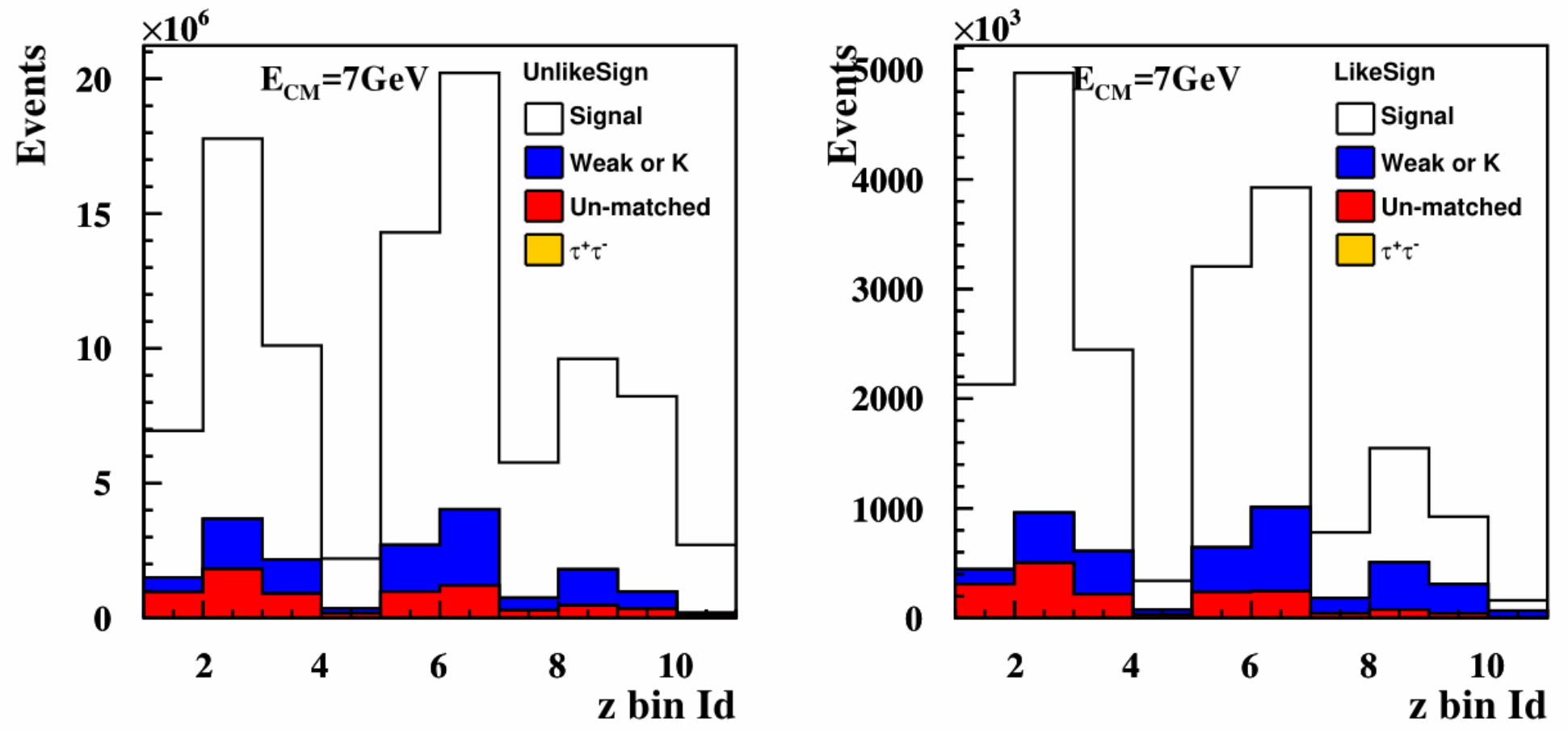
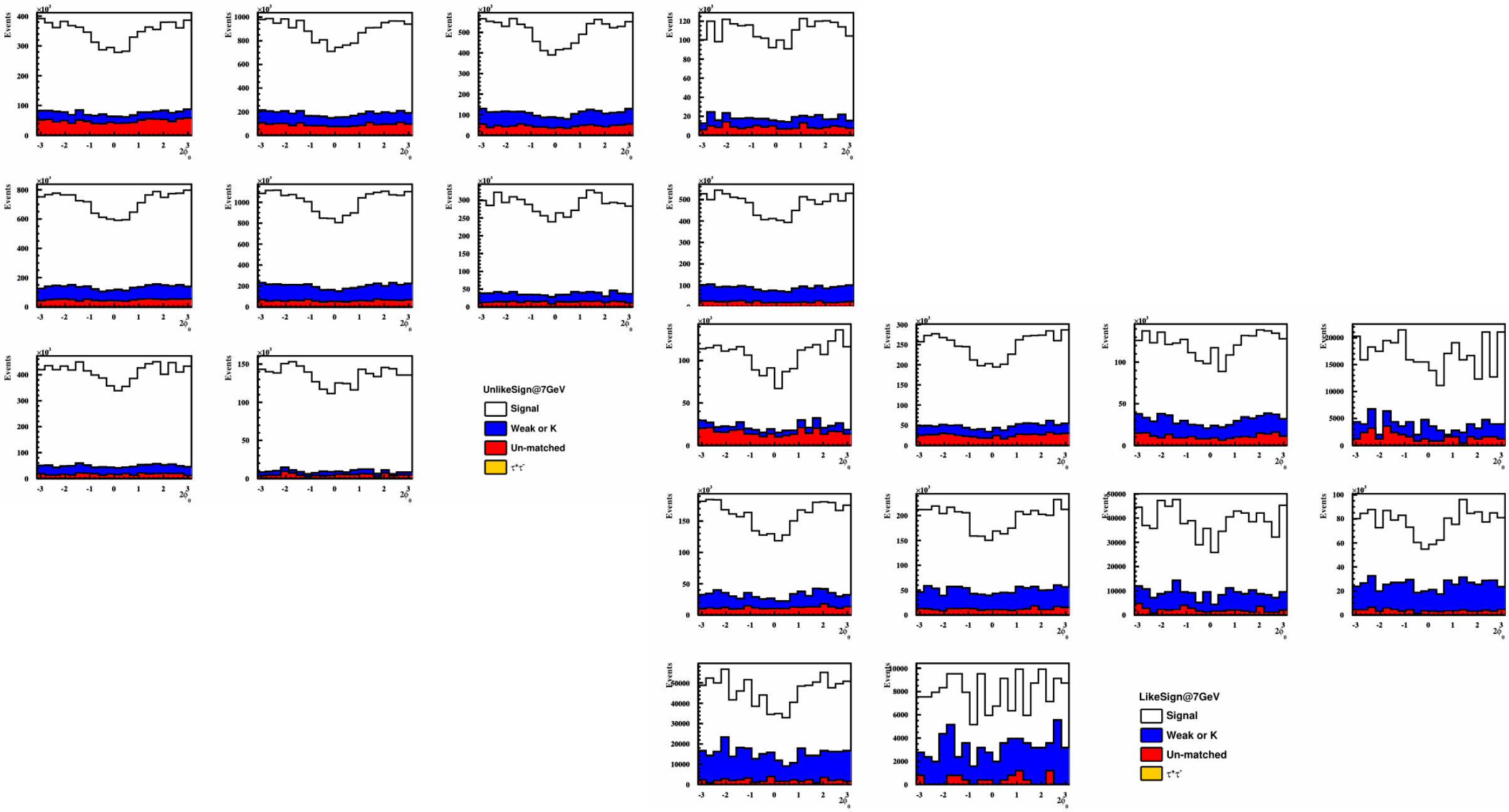
τ+τ-
2
4
6
8
10
z bin Id

KK, Kpi误混1%


×10^6
Events
E_CM=7GeV
UnlikeSign
Signal
Weak or K
Un-matched
τ+τ-
0
5
10
15
20
2
4
6
8
10
z bin Id
×10^3
Events
E_CM=7GeV
LikeSign
Signal
Weak or K
Un-matched
τ+τ-
0
1000
2000
3000
4000
5000
2
4
6
8
10
z bin Id


UnlikeSign@7GeV
Signal
Weak or K
Un-matched
$\tau^+\tau^-$
LikeSign@7GeV
Signal
Weak or K
Un-matched
$\tau^+\tau^-$
Events
$2\phi_0^3$

上次遗留的两个问题

Fast Simulated result
3. parameterization

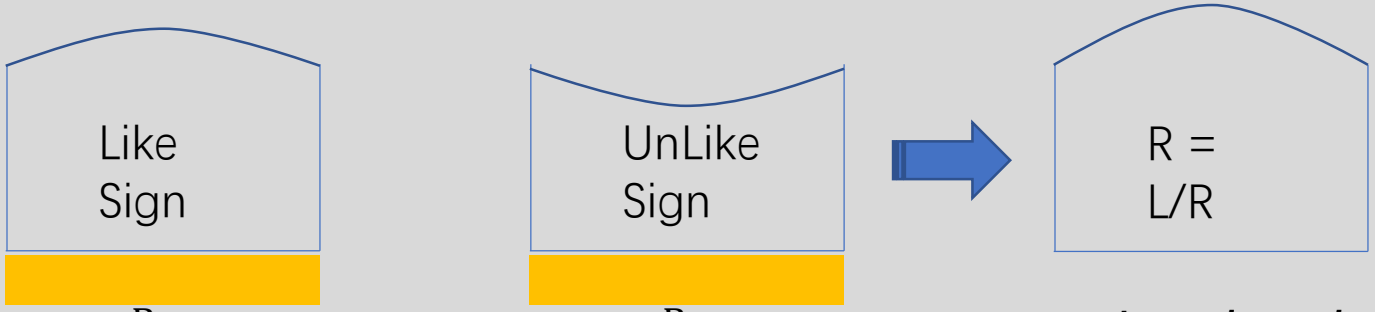
Assume:

$$k = \frac{A}{A+B} < 1$$
$$\alpha' = k\alpha$$

1) For Pure signal

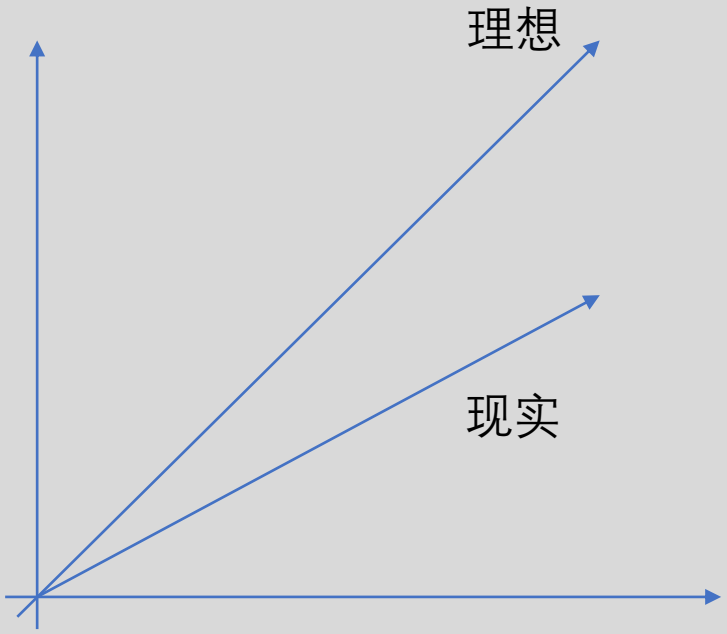
$A_1(1 + \alpha_1 \cos\phi)$ $A_2(1 + \alpha_2 \cos\phi)$ $\alpha = \alpha_1 - \alpha_2$

1) For signal + bkg



$A_1(1 + \frac{B_1}{A_1} + \alpha_1 \cos\phi)$ $A_2(1 + \frac{B_2}{A_2} + \alpha_2 \cos\phi)$ $\alpha' = \alpha'_1 - \alpha'_2$

$$\alpha'_1 = \frac{A_1\alpha_1}{A_1 + B_1} \qquad \alpha'_2 = \frac{A_2\alpha_2}{A_2 + B_2}$$

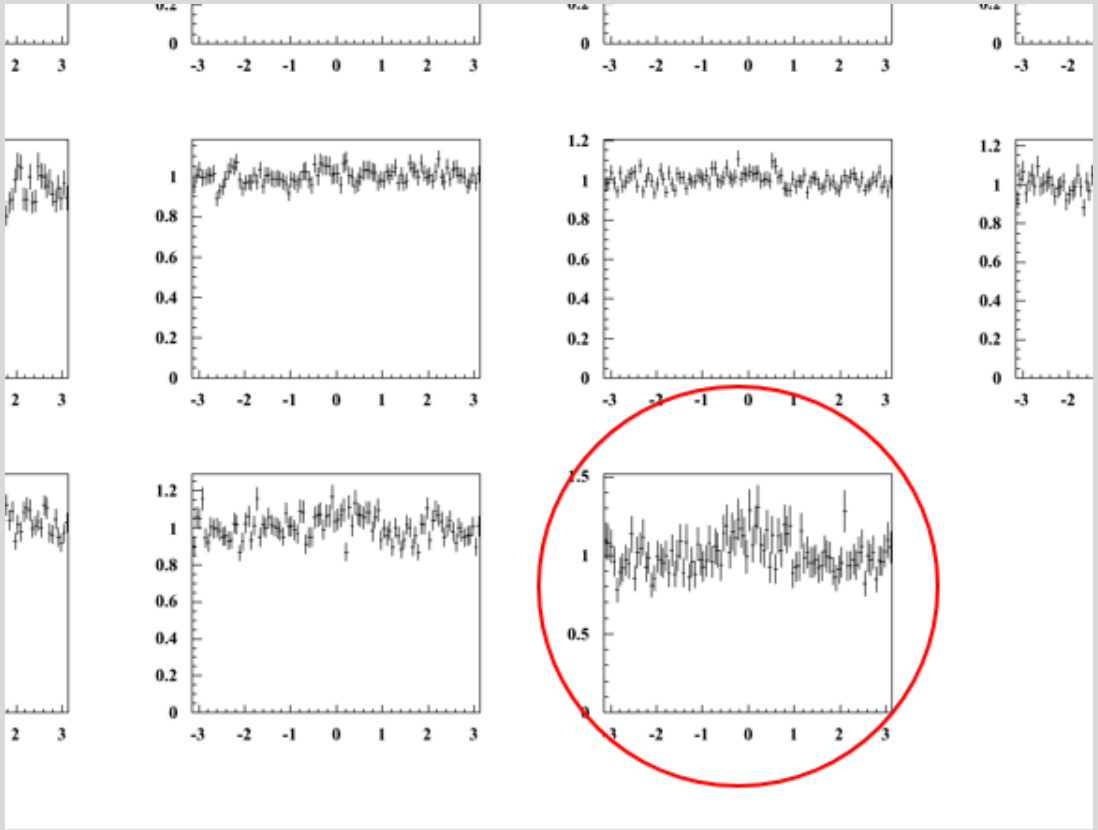


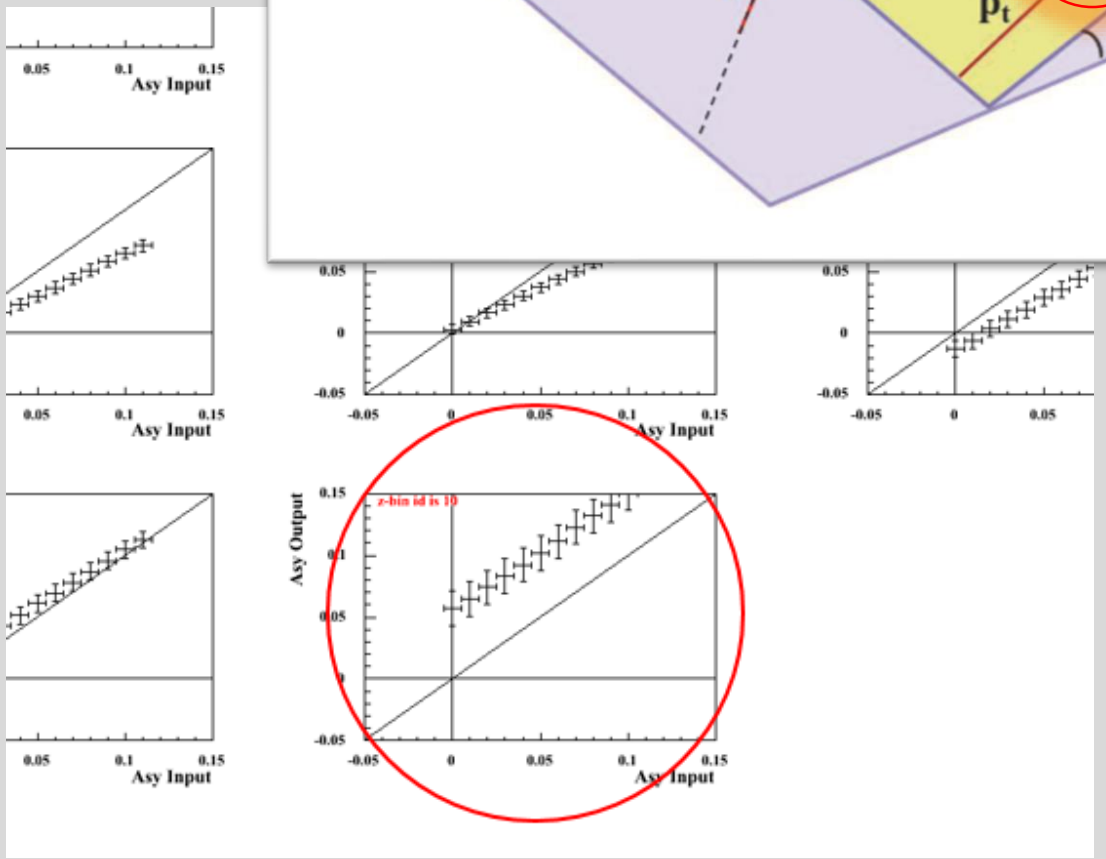
考虑到$K\pi$本底中也有Collins Effect

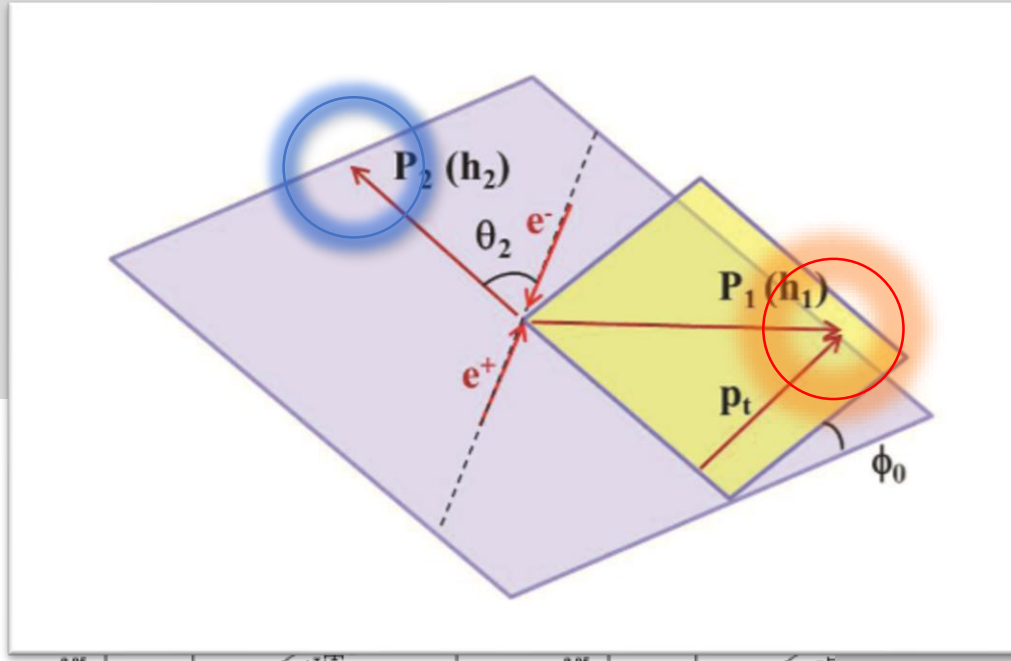
平本底　　Kπ误混

- $W \propto 1 + \alpha_U \cos(2\phi) + f_U + f_{UK\pi}(1 + \alpha_{UK\pi} \cos(2\phi))$
- $\alpha'_U = \frac{\alpha_U + f_{UK\pi}\alpha_{UK\pi}}{1 + f_U + f_{UK\pi}}$

One thing more
I think this peak may come from the angular resolution







在这个bin里truth的RU/RL是平的，truth放入不对称度的IO也是OK的

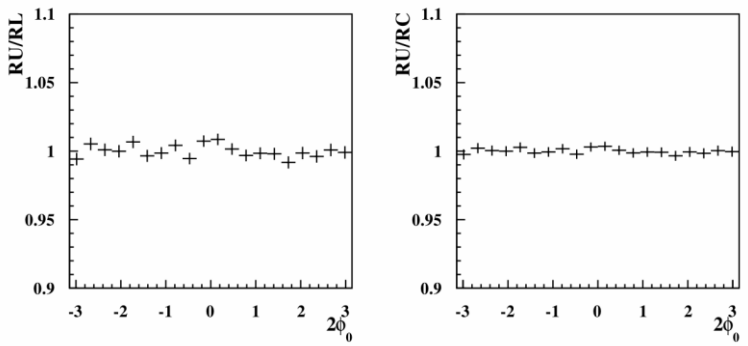
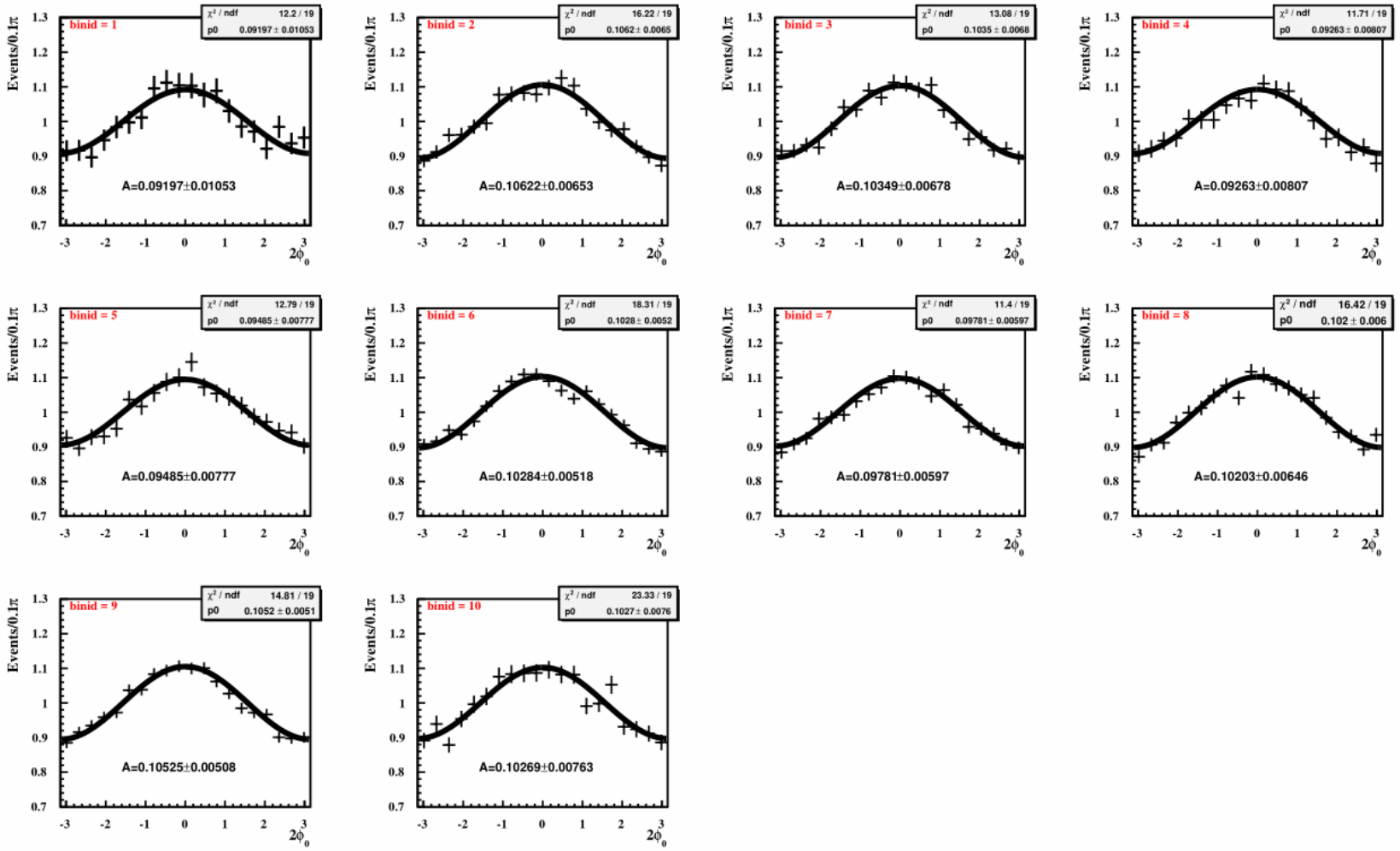
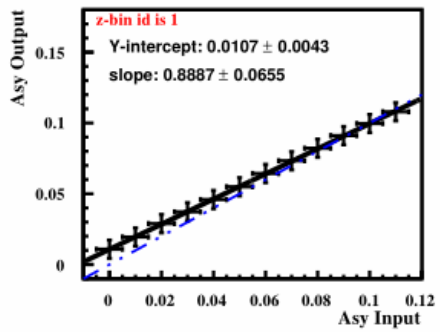
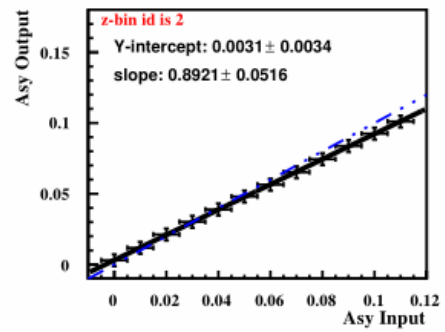
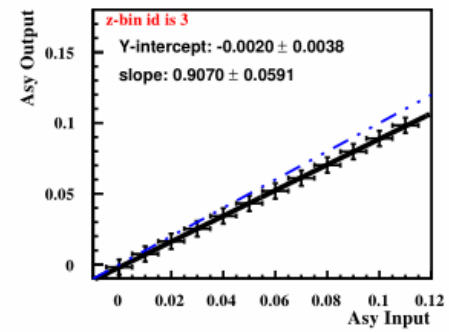


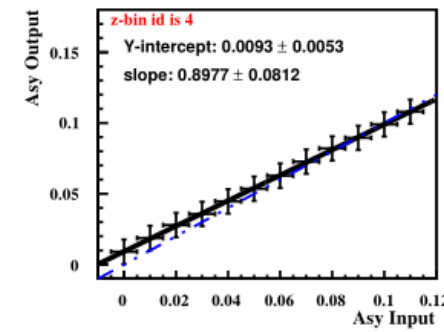
图 3.25 truth角分布

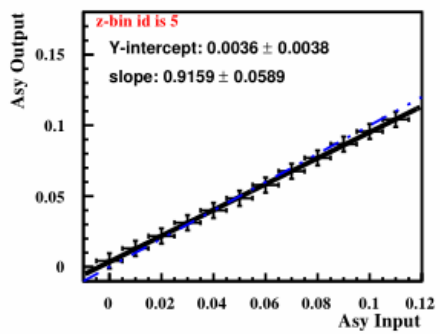


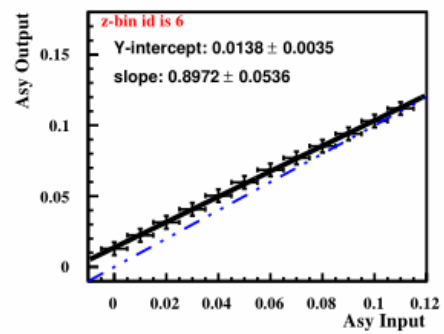

z-bin id is 1
Y-intercept: 0.0107 ± 0.0043
slope: 0.8887 ± 0.0655
Asy Output
Asy Input

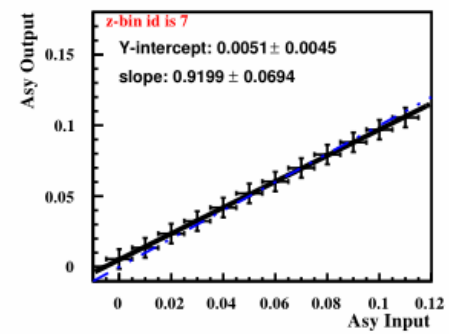

z-bin id is 2
Y-intercept: 0.0031 ± 0.0034
slope: 0.8921 ± 0.0516
Asy Output
Asy Input

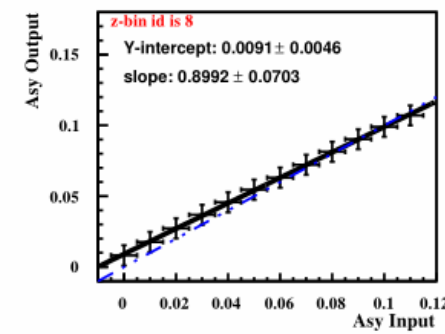

z-bin id is 3
Y-intercept: -0.0020 ± 0.0038
slope: 0.9070 ± 0.0591
Asy Output
Asy Input

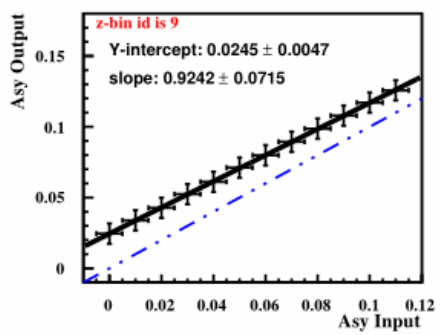

z-bin id is 4
Y-intercept: 0.0093 ± 0.0053
slope: 0.8977 ± 0.0812
Asy Output
Asy Input

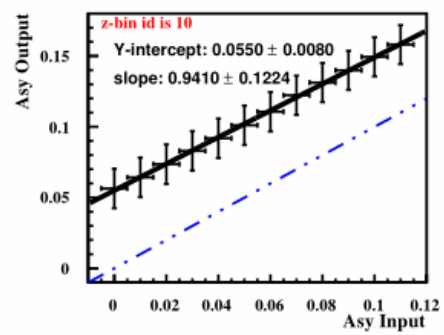

z-bin id is 5
Y-intercept: 0.0036 ± 0.0038
slope: 0.9159 ± 0.0589
Asy Output
Asy Input


z-bin id is 6
Y-intercept: 0.0138 ± 0.0035
slope: 0.8972 ± 0.0536
Asy Output
Asy Input


z-bin id is 7
Y-intercept: 0.0051 ± 0.0045
slope: 0.9199 ± 0.0694
Asy Output
Asy Input

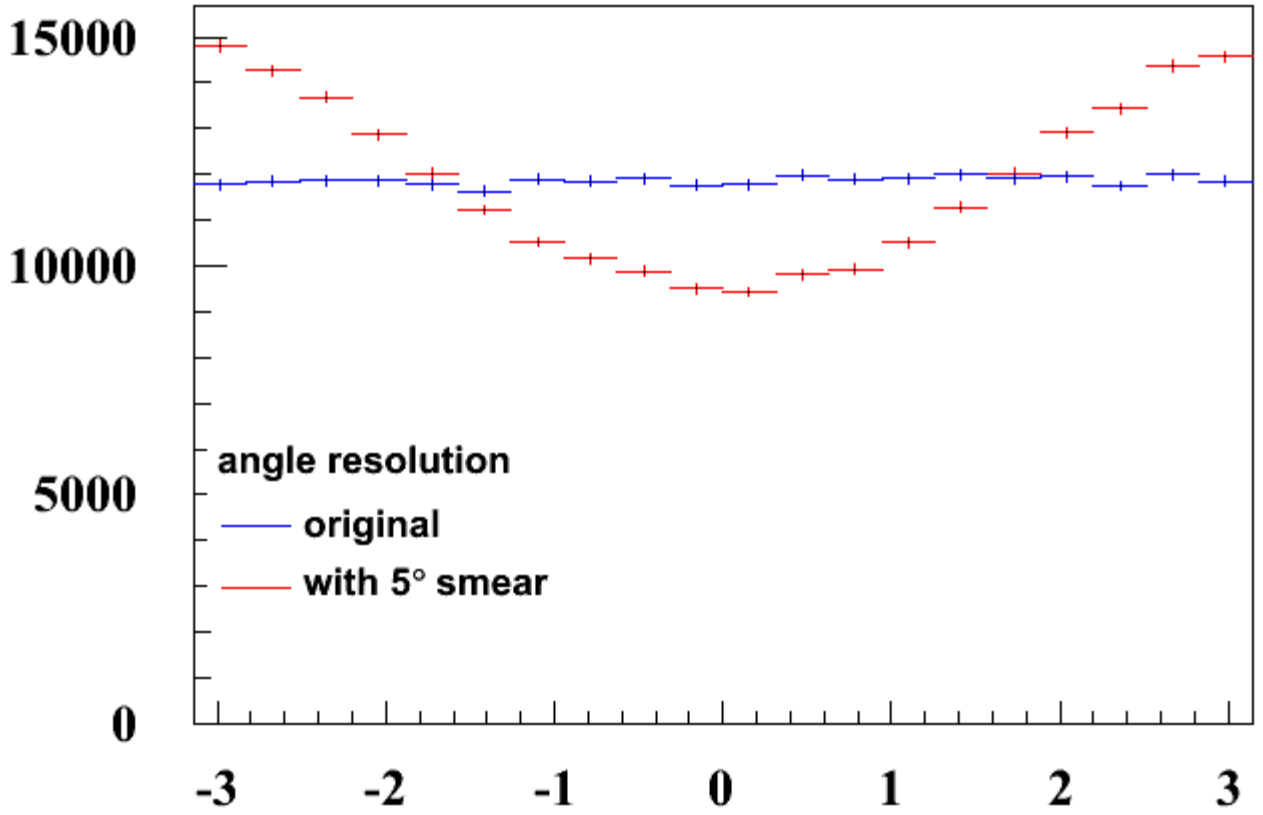

z-bin id is 8
Y-intercept: 0.0091 ± 0.0046
slope: 0.8992 ± 0.0703
Asy Output
Asy Input


z-bin id is 9
Y-intercept: 0.0245 ± 0.0047
slope: 0.9242 ± 0.0715
Asy Output
Asy Input


z-bin id is 10
Y-intercept: 0.0550 ± 0.0080
slope: 0.9410 ± 0.1224
Asy Output
Asy Input

做了个检查

- MC：$ee \to \pi^+\pi^- p$ @$7GeV$
- 蓝色：truth，
- 红色：两个π都smear 5度
- Cut1: $\pi^+\pi^-$夹角>120
- Cut2: $z1, z2 > 0.7$



- 但是理论上这个效应应该在构造RU/RL的时候消掉了，所以对最后一个binCollins效应的跳起，我也没有合理的解释。