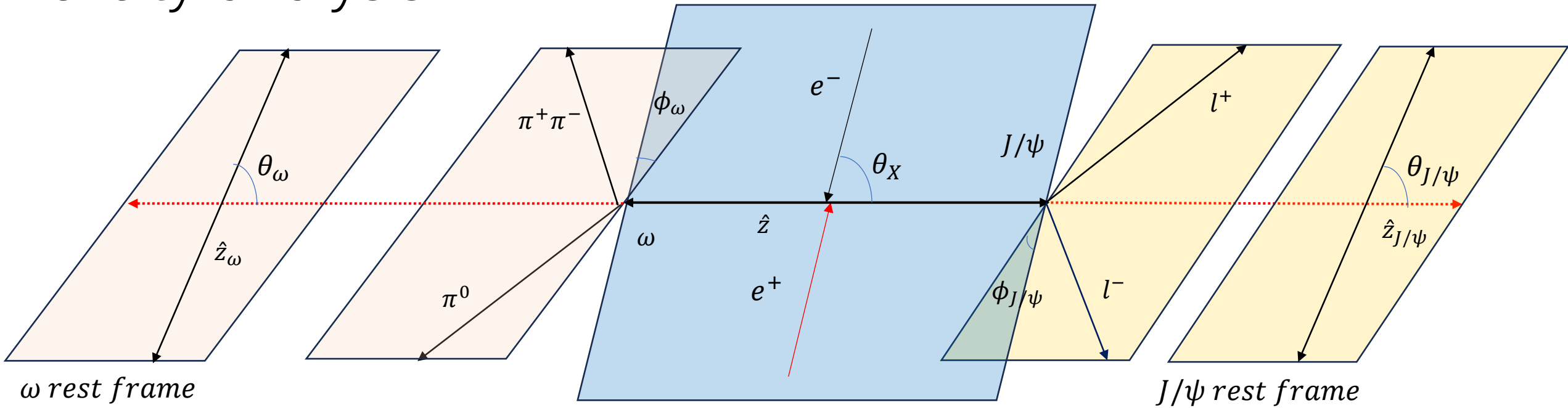
Group meeting

2025/11/28

Helicity analysis



e^+e^- c.m.sys

θ_X: e^+e^- 质心系下J/ψ与 z轴的极角。
$\phi_{J/\psi}(\phi_\omega)$: $J/\psi(\omega)$ 产生平面与衰变平面的夹角。
$\theta_{J/\psi}$: J/ψ质心系下l与z轴的极角。
θ_ω: ω质心系下衰变平面的法向量与z轴的夹角。

Toy MC check （20万未经过探测器模拟）

$$\frac{1}{8}\left(3H1^2+2H2^2-2\left(H2^2-H1^2\cos[\text{phiJpsi}+\text{phiOmega}]^2\right)\cos[2\,\text{thetaJpsi}]-\left(3H1^2-2H2^2+\left(H1^2+2H2^2\right)\cos[2\,\text{thetaJpsi}]\right)\cos[2\,\text{thetaOmega}]+H1^2\cos[2\,(\text{phiJpsi}+\text{phiOmega})]\left(-1+2\cos[2\,\text{thetaOmega}]\sin[\text{thetaJpsi}]^2\right)+4\,H1\,H2\cos[\text{phiJpsi}+\text{phiOmega}]\sin[2\,\text{thetaJpsi}]\sin[2\,\text{thetaOmega}]\right)$$

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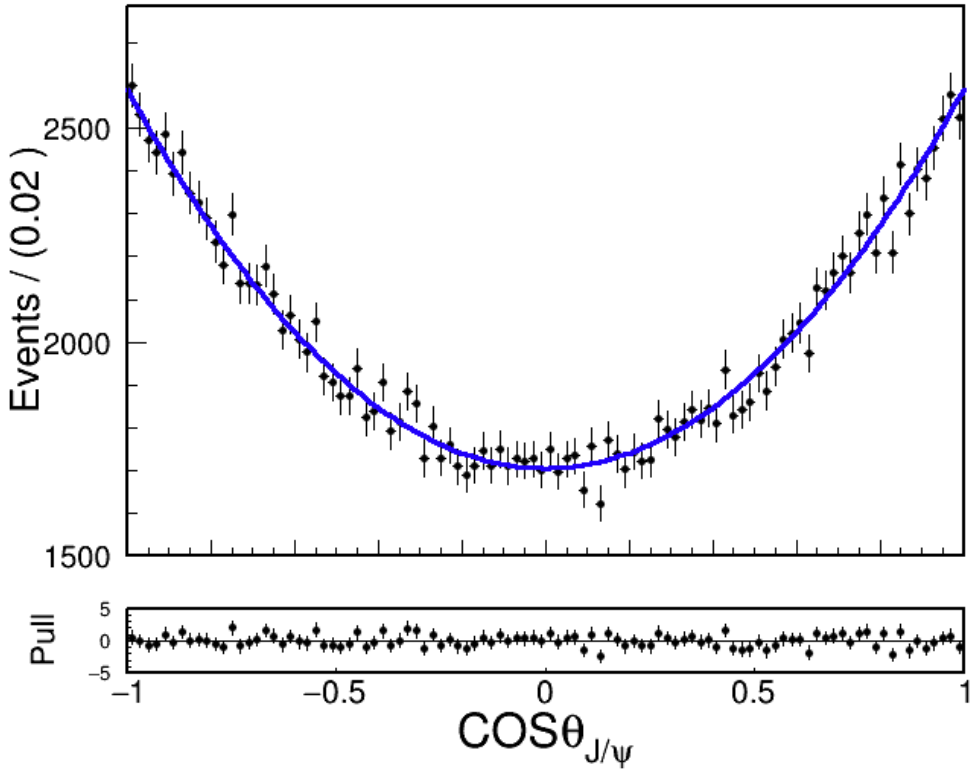
```
H1 = 0.15; H2 = Sqrt[4 / Pi^4 - 3 / 2 * H1^2]
```

平方根 圆周率

(空间概率密度归一)

$$\frac{1}{2}\pi^3\left(3H1^2+2H2^2+\left(H1^2-2H2^2\right)\cos[2\,\text{thetaJpsi}]\right)$$ 对其余角度积分



H1=0.154 ± 0.03

Toy MC check （20万未经过探测器模拟）

$$\frac{1}{8}\left(3H1^2+2H2^2-2\left(H2^2-H1^2\cos[\text{phiJpsi}+\text{phiOmega}]^2\right)\cos[2\,\text{thetaJpsi}]-\left(3H1^2-2H2^2+\left(H1^2+2H2^2\right)\cos[2\,\text{thetaJpsi}]\right)\cos[2\,\text{thetaOmega}]+\right.$$
余弦　余弦　余弦

$$\left.H1^2\cos[2\,(\text{phiJpsi}+\text{phiOmega})]\left(-1+2\cos[2\,\text{thetaOmega}]\sin[\text{thetaJpsi}]^2\right)+4\,H1\,H2\cos[\text{phiJpsi}+\text{phiOmega}]\sin[2\,\text{thetaJpsi}]\sin[2\,\text{thetaOmega}]\right)$$
余弦　余弦　余弦　正弦　正弦

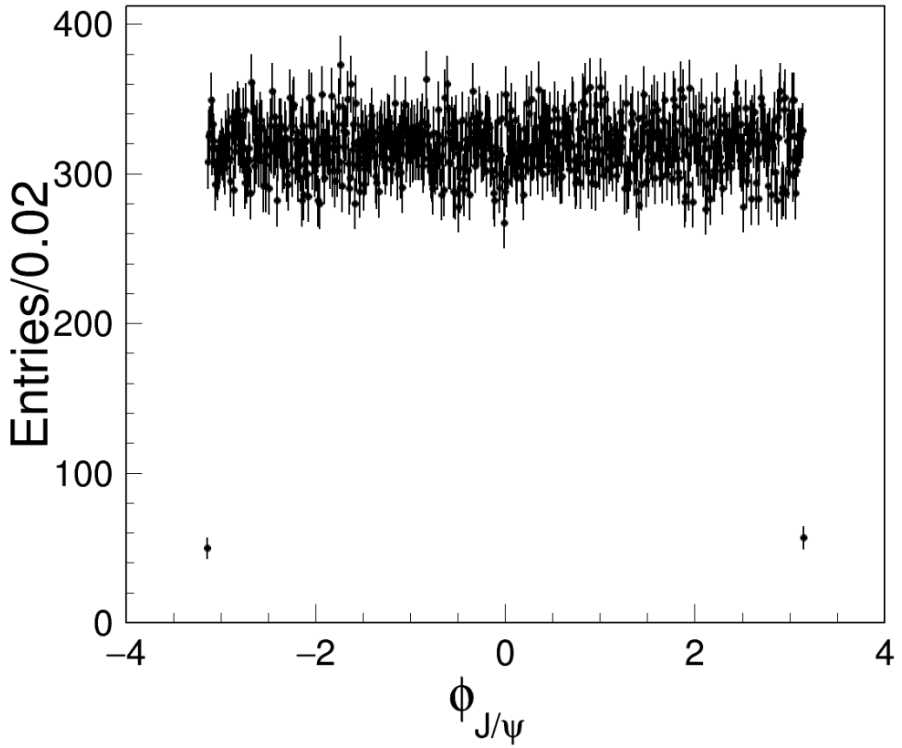
```
H1 = 0.15; H2 = Sqrt[4 / Pi^4 - 3 / 2 * H1^2]
```
平方根　圆周率

$$\frac{1}{4}\left(3H1^2+2H2^2\right)\pi^3$$

(空间概率密度归一)

对其余角度积分，对$\phi_{J/\psi}$与相空间一致

```
const double twopi = 2.*3.14159265 ;
double phi = twopi * gRandom->Uniform();
double cth = 2.*gRandom->Uniform() - 1. ;
double sth = sqrt(1. - cth * cth);
```



$\phi_{J/\psi}=\pm\pi$时，
事例数过少。