Weekly report

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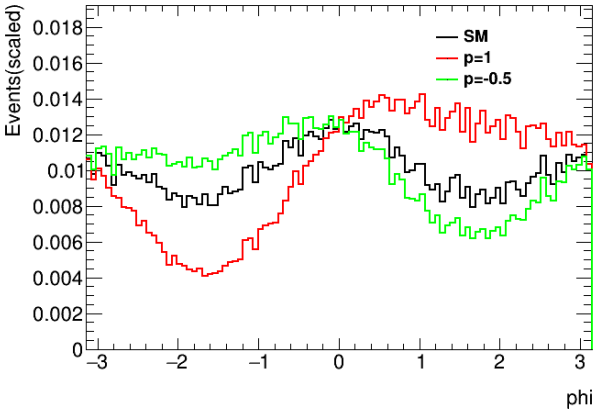
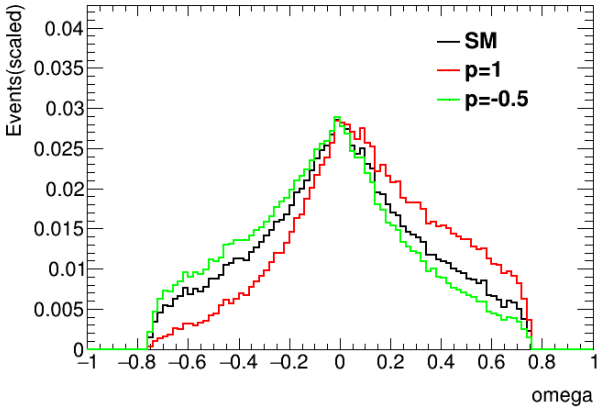
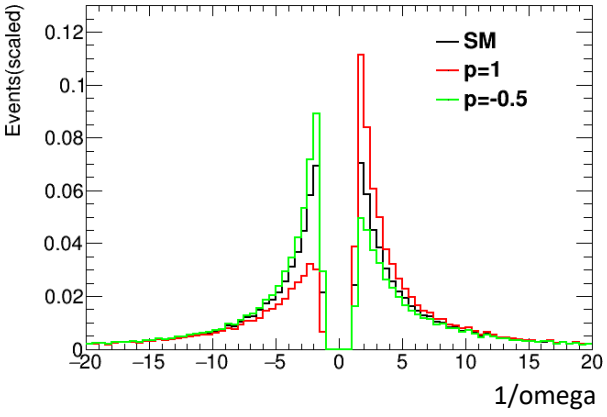
CEPC Higgs CP

Previous review







Separation power(SM vs. p=1):

$cos\theta_1$: 3.78×10^{-4}

$cos\theta_2$: 2.38×10^{-4}

ϕ: 4.89×10^{-2}

ω: 5.75×10^{-2}

$1/\omega$: 6.62×10^{-2}

CEPC Higgs CP

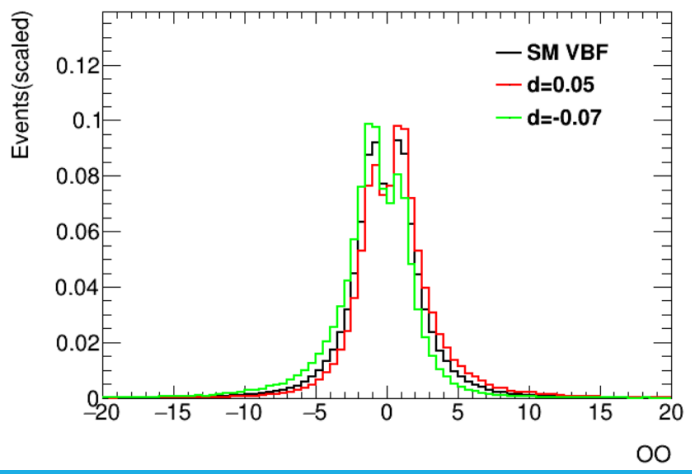
Optimal variable cross check with VBF Higgs CP:

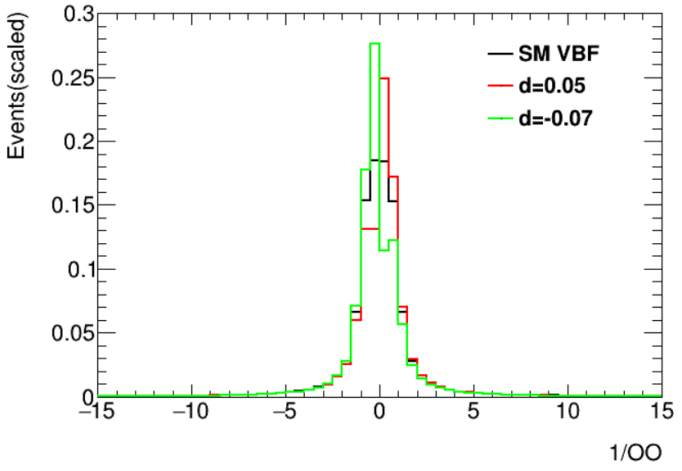
- In VBF: $|\mathcal{M}|^2 = |\mathcal{M}_{SM}|^2 + d * 2Re(\mathcal{M}_{SM}^* \mathcal{M}_{CP-odd})$

$$OO = \frac{2Re(\mathcal{M}_{SM}^* \mathcal{M}_{CP-odd})}{|\mathcal{M}_{SM}|^2}$$

- In CEPC: $\frac{d\sigma}{dcos\theta_1 dcos\theta_2 d\phi} = N\,(J_{CP-even}(\theta_1, \theta_2, \phi) + p \cdot J_{CP-odd}(\theta_1, \theta_2, \phi))$,

$$\omega = \frac{J_{CP-odd}(\theta_1,\theta_2,\phi)}{J_{CP-even}(\theta_1,\theta_2,\phi)}$$





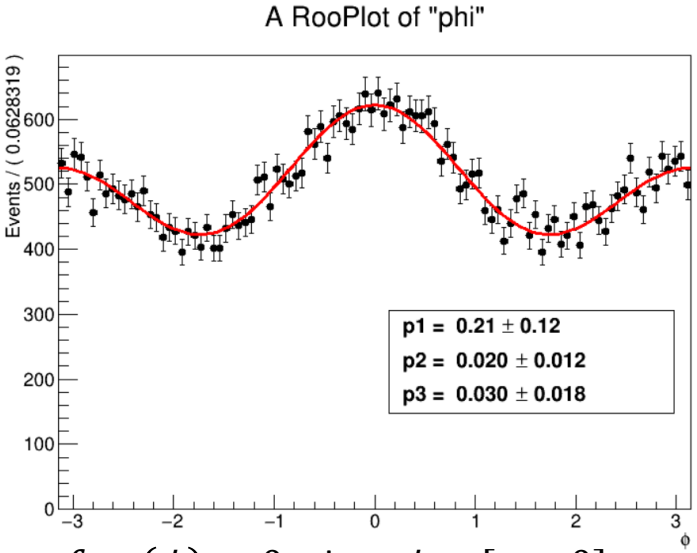
CEPC Higgs CP

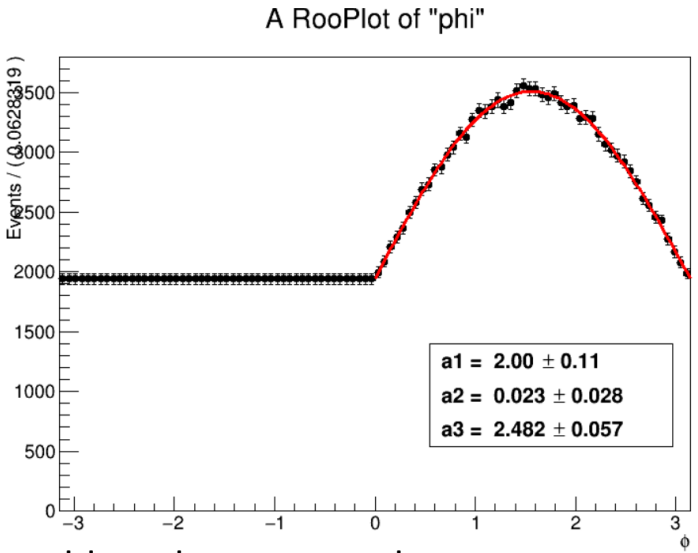
Precision with ϕ:

- ϕ distribution could be expressed with an analytic function:

$f_{even}(\phi) = p_0 + p_1\cos(\phi) + p_2\cos(2\phi)$

$f_{odd}(\phi) = (p_0 + p_1\cos(\phi))\sin(\phi)$



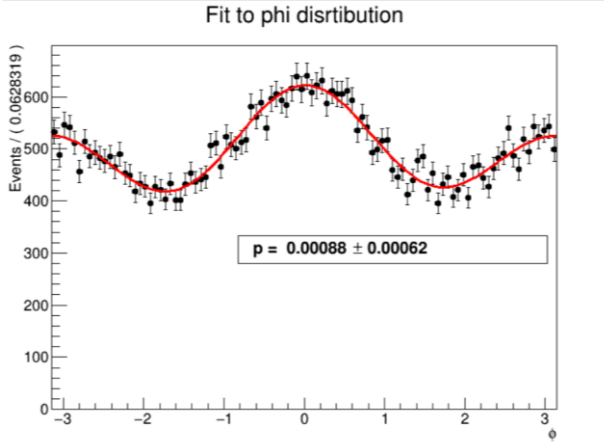


$f_{odd}(\phi) < 0$ when $\phi \in [-\pi, 0]$, so events could not be generated.
Fit in $\phi \in [0, \pi]$ only to get p_0 and p_1

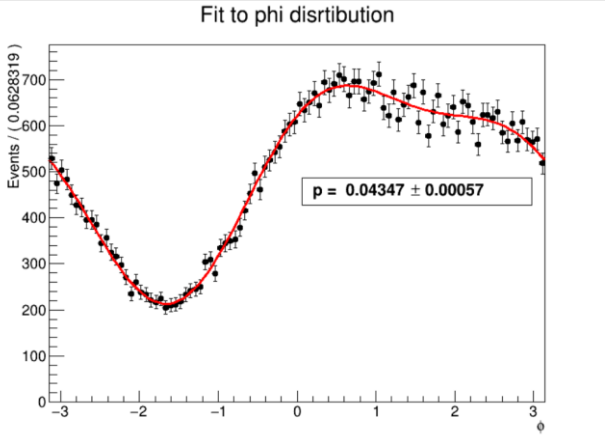
CEPC Higgs CP

Precision with ϕ

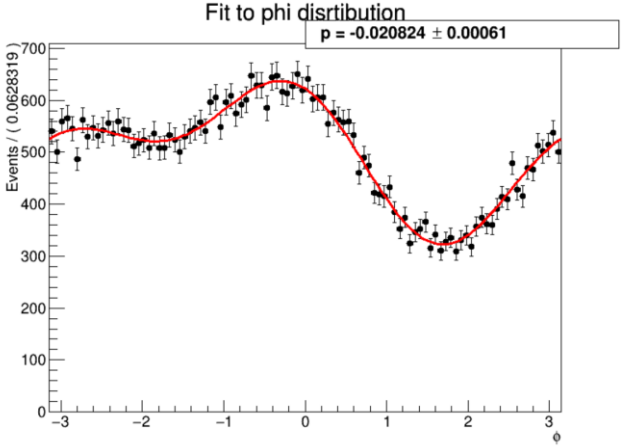
- Total PDF: $f(\phi) = f_{even}(\phi) + p \cdot f_{odd}(\phi)$, fit p value.



SM (p=0)



p=1



p=0.5

- Fitted p is not as what we import.
- How to express the result? $p \pm \Delta p$ or a upper limit of p?