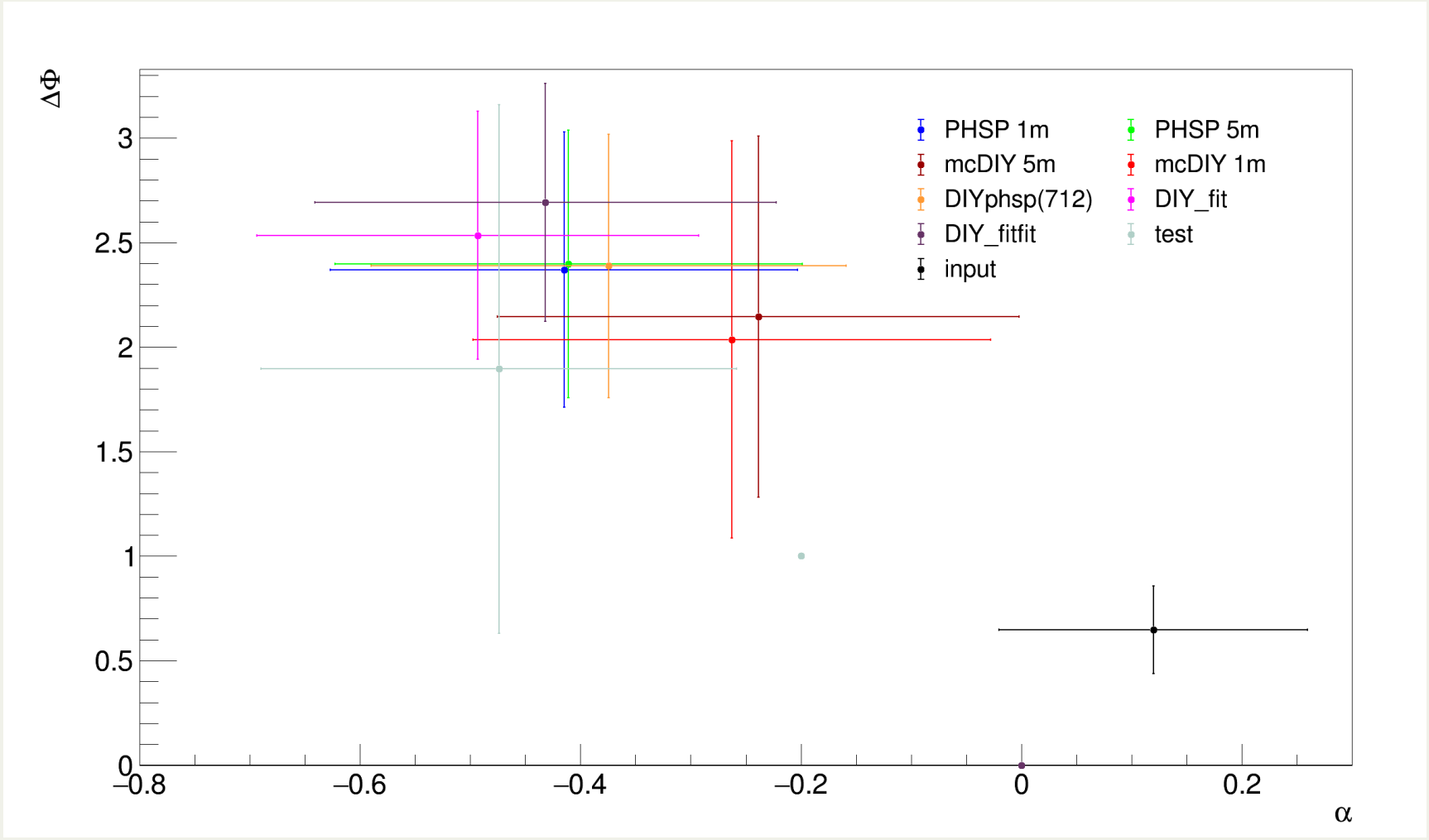
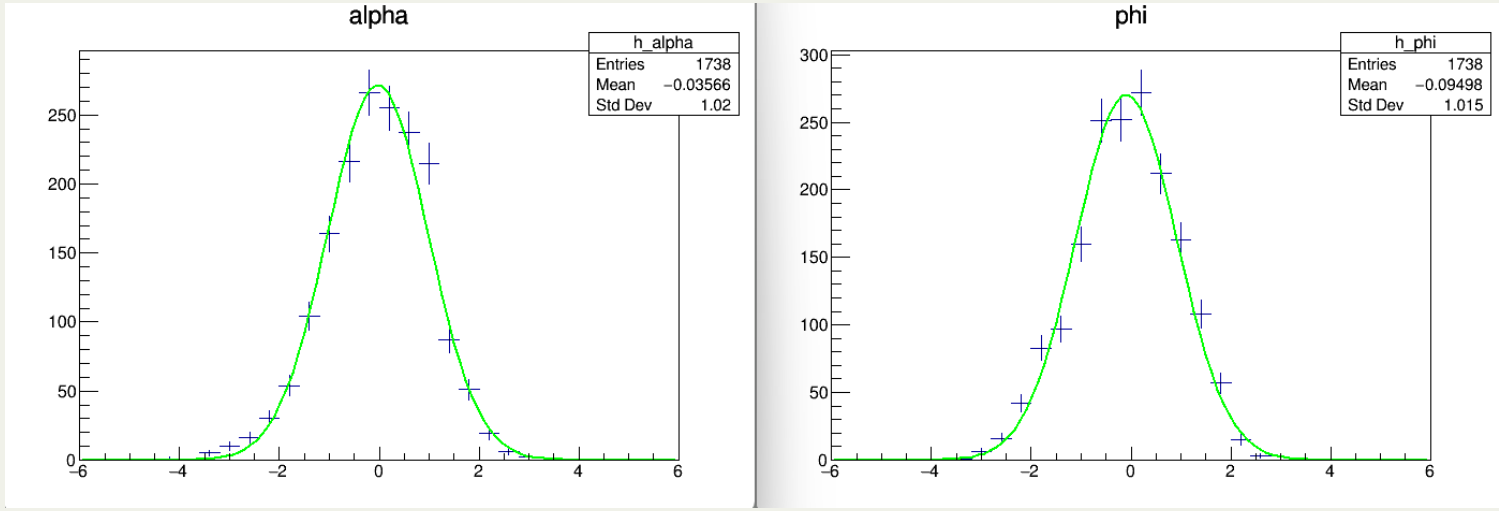
Fit result


ΔΦ
3
2.5
2
1.5
1
0.5
0
−0.8
−0.6
−0.4
−0.2
0
0.2
α
PHSP 1m
PHSP 5m
mcDIY 5m
mcDIY 1m
DIYphsp(712)
DIY_fit
DIY_fitfit
test
input

Pull distribution

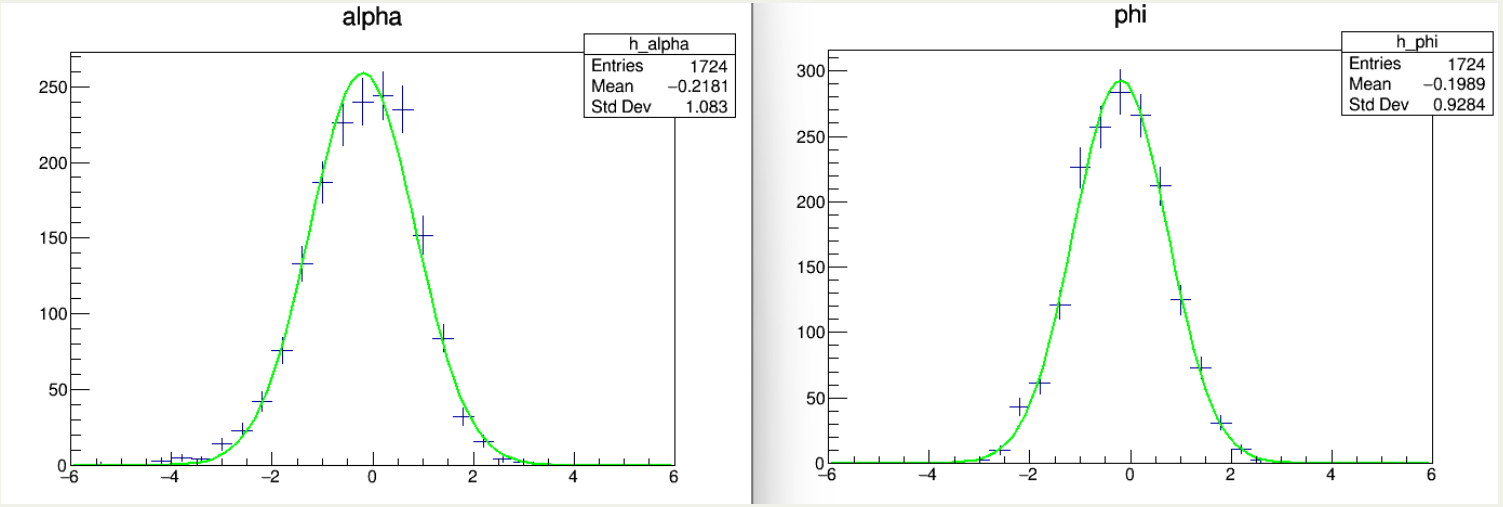
- Pure signal




```
FCN=31.681 FROM MIGRAD    STATUS=CONVERGED      52 CALLS          53 TOTAL
                     EDM=8.43458e-07    STRATEGY= 1      ERROR MATRIX ACCURATE
 EXT PARAMETER                                   STEP         FIRST
 NO.   NAME      VALUE            ERROR          SIZE      DERIVATIVE
  1  Constant     2.71786e+02   8.25695e+00   1.83640e-02  -1.76964e-04
  2  Mean        -2.75126e-02   2.52315e-02   6.80533e-05  -2.31167e-02
  3  Sigma        1.00257e+00   1.85511e-02   1.32176e-05  -1.87768e-01
FCN=32.6702 FROM MIGRAD    STATUS=CONVERGED      54 CALLS          55 TOTAL
                     EDM=1.29257e-08    STRATEGY= 1      ERROR MATRIX ACCURATE
 EXT PARAMETER                                   STEP         FIRST
 NO.   NAME      VALUE            ERROR          SIZE      DERIVATIVE
  1  Constant     2.70419e+02   7.99420e+00   1.85503e-02  -8.66389e-06
  2  Mean        -9.24771e-02   2.54498e-02   6.99254e-05   1.50144e-03
  3  Sigma        1.00853e+00   1.74346e-02   1.29957e-05  -3.08491e-02
```

Pull distribution

- Sig + bkg

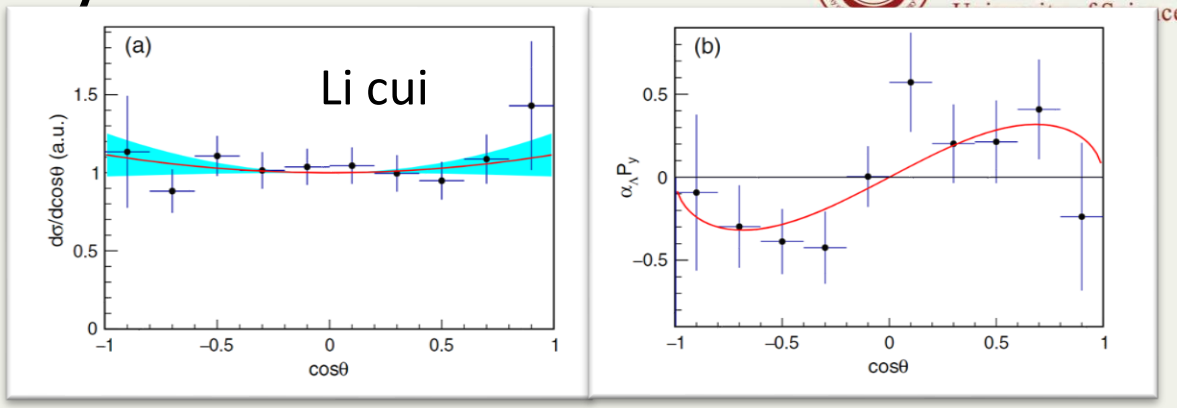



```
FCN=31.7037 FROM MIGRAD    STATUS=CONVERGED      60 CALLS          61 TOTAL
                     EDM=5.20049e-09    STRATEGY= 1      ERROR MATRIX ACCURATE
 EXT PARAMETER                                   STEP         FIRST
 NO.   NAME      VALUE            ERROR          SIZE      DERIVATIVE
  1  Constant     2.59003e+02   7.84075e+00   1.75809e-02  -1.23782e-05
  2  Mean        -1.99842e-01   2.64569e-02   7.10429e-05   3.06651e-04
  3  Sigma        1.04322e+00   1.89287e-02   1.29001e-05   1.64662e-03
FCN=10.9846 FROM MIGRAD    STATUS=CONVERGED      63 CALLS          64 TOTAL
                     EDM=1.24957e-10    STRATEGY= 1      ERROR MATRIX ACCURATE
 EXT PARAMETER                                   STEP         FIRST
 NO.   NAME      VALUE            ERROR          SIZE      DERIVATIVE
  1  Constant     2.92983e+02   8.59515e+00   1.19660e-02   1.48680e-06
  2  Mean        -1.96563e-01   2.27309e-02   3.84225e-05   4.08128e-04
  3  Sigma        9.34147e-01   1.57620e-02   7.82267e-06   1.21203e-05
```

Data's Py distribution

$$P_y = \frac{\sqrt{1-\eta^2}\sin\theta\cos\theta}{1+\eta\cos^2\theta}\sin(\Delta\Phi). \quad (4)$$

Finally, the $\alpha_\Lambda^2[\mathcal{T}_1 + \sqrt{1-\eta^2}\cos(\Delta\Phi)\mathcal{T}_2 + \eta\mathcal{T}_6]$ term describes the spin correlations between the two hyperons. The asymmetry parameter α_Λ has recently been measured by the BESIII Collaboration to be $\alpha_\Lambda = 0.750 \pm 0.010$ [20]. This value has been adopted by the



Furthermore, the nonzero $\Delta\Phi$ will lead to a dependence of the polarization on the scattering angle of the Σ^+ [32,51]:

$$P_y = -\frac{\sqrt{1-\alpha^2}\sin\theta_{\Sigma^+}\cos\theta_{\Sigma^+}}{1+\alpha\cos^2\theta_{\Sigma^+}}\sin(\Delta\Phi). \quad (6)$$

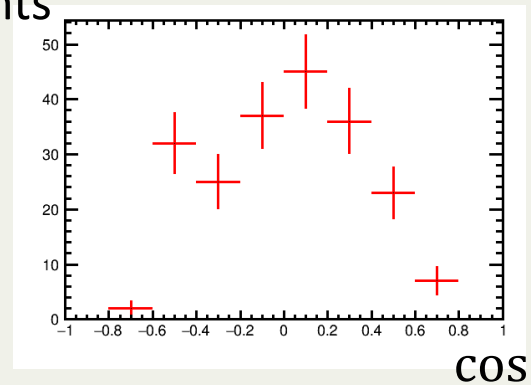
Experimentally, the P_y is determined by

$$P_y = \frac{m}{N}\sum_{i=1}^{N_k}\frac{(3+\alpha)(n^i_{1,y}+n^i_{2,y})}{(\alpha_1-\alpha_2)(1+\alpha\cos^2\theta^i_{\Sigma^+})}, \quad (7)$$

where N is the total number of events in the dataset and $m = 8$ is the number of bins in $\cos\theta_{\Sigma^+}$; N_k denotes the number of events in the kth $\cos\theta_{\Sigma^+}$ bin; and $n_{1,y}$ ($n_{2,y}$)

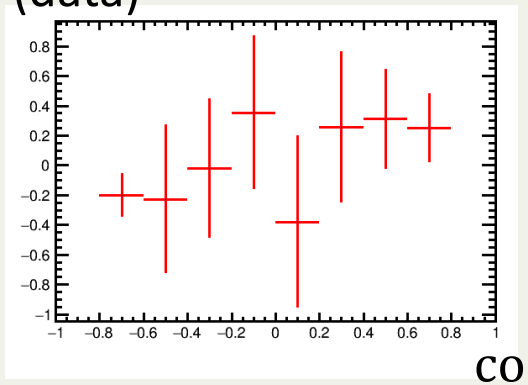
helicity frame, respectively; and α_1 and α_2 are the decay asymmetry parameters of the Σ^+ and $\bar{\Sigma}^-$. The set of angular distribution functions $\mathcal{F}_i(\xi)$ $(i = 0, 1, \ldots, 6)$ are obtained in Ref. [42]. Owing to limited statistics, we assume CP to be conserved and $\alpha_1 = -\alpha_2 = -0.980$ [41]. The α is the angular

Events

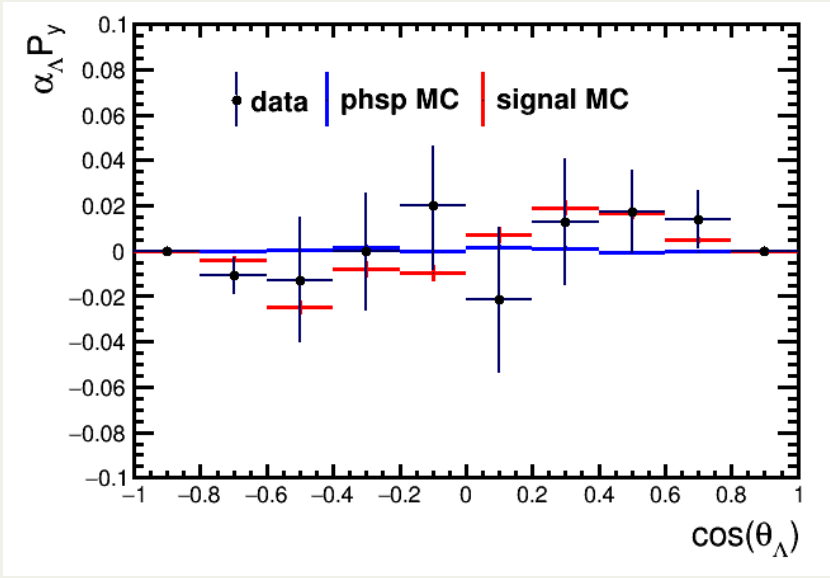


$\cos\theta_\Lambda$

$\alpha_\Lambda P_y$ (data)



$\cos\theta_\Lambda$



MC's Py distribution

$$\alpha_\Lambda P_y = \frac{(\alpha_\Lambda P_y)_{data} - (\alpha_\Lambda P_y)_{bkg}}{(\cos\theta_\Lambda)_{rec}/(\cos\theta_\Lambda)_{truth}}$$