

# PWA Challenge with polarized photon beam

Florida International University 2020

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# Generated $2 \cdot 10^6$ ( $p\eta'\pi^0$ ) events with AmpTools

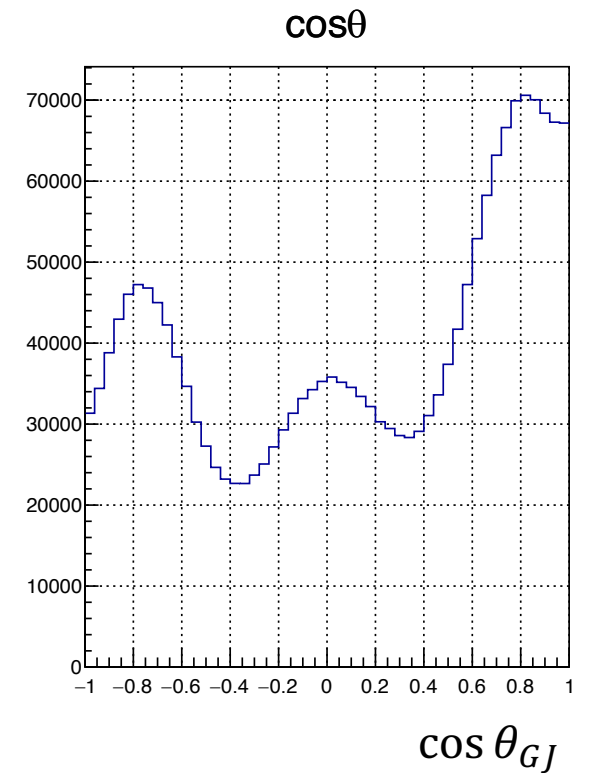
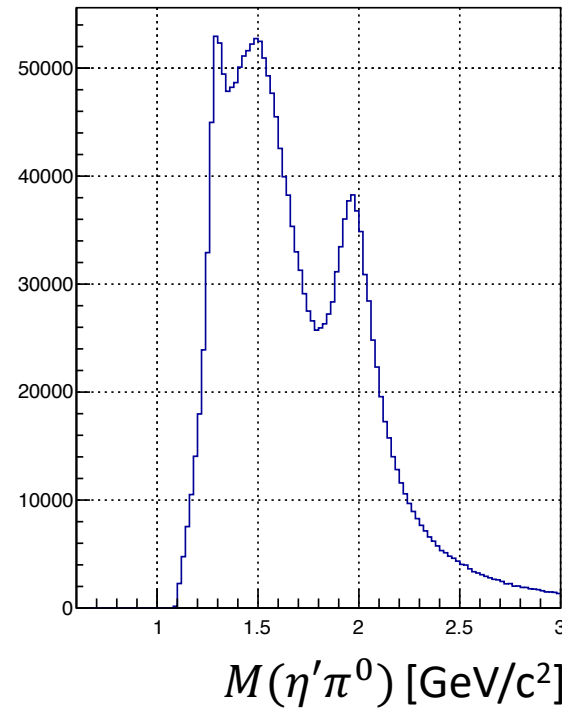
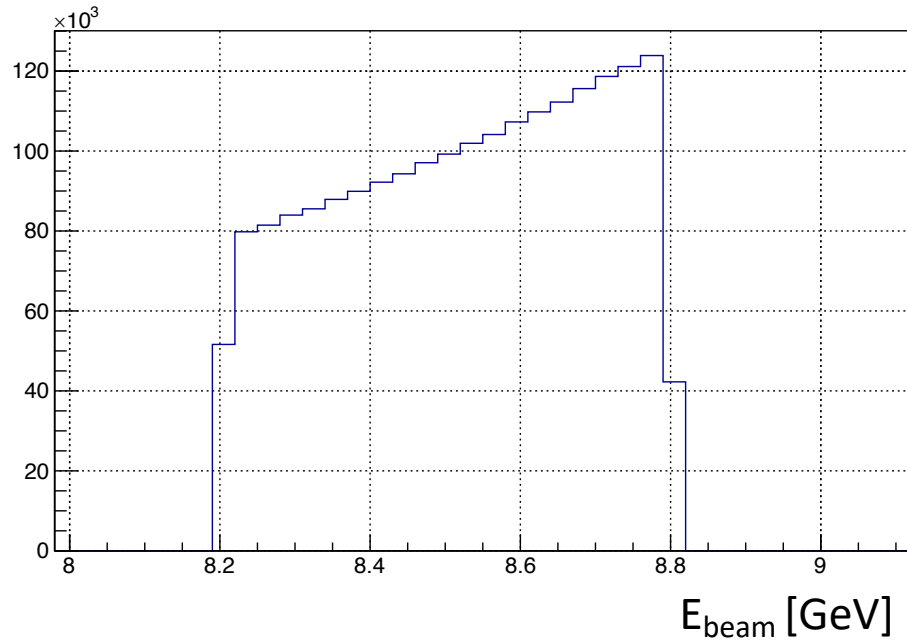
Generated amplitudes are

- $P1/\pi_1$  (1600 MeV) (**exotic**)
- $D1/a_2$  (1320 MeV)
- $G1/a_4$  (1995)

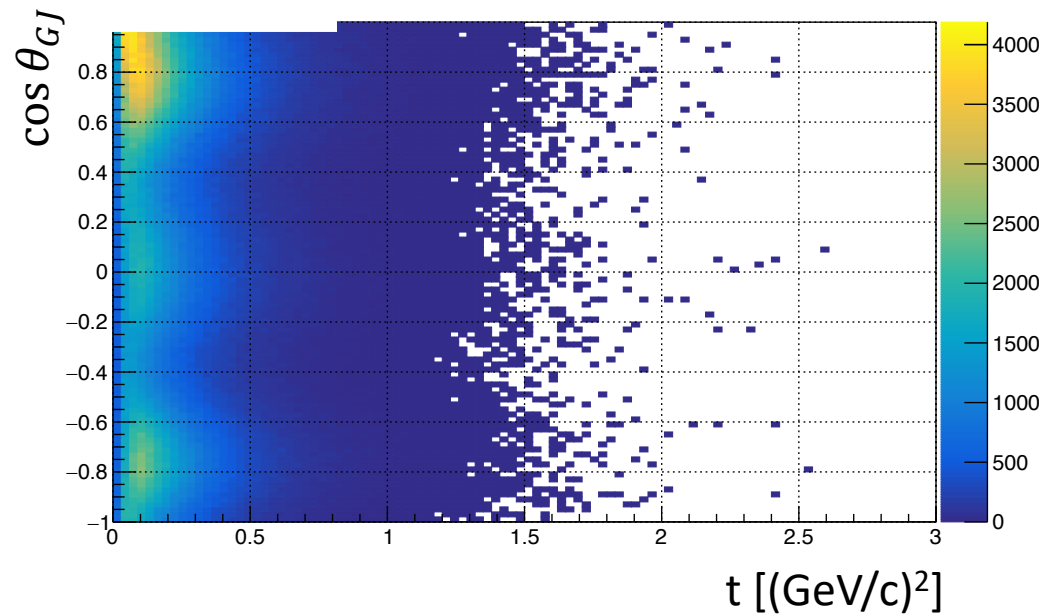
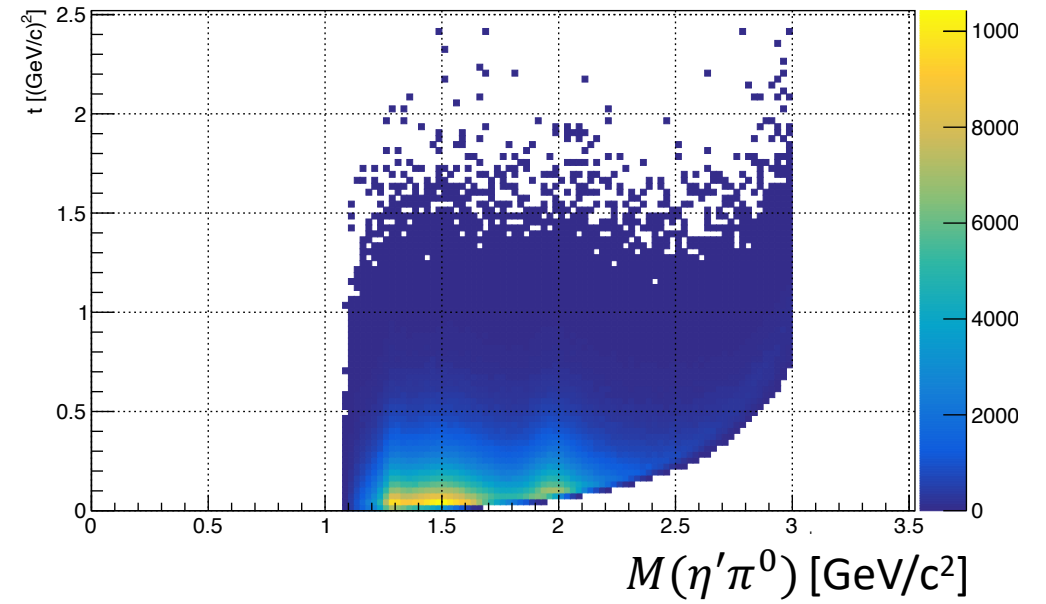
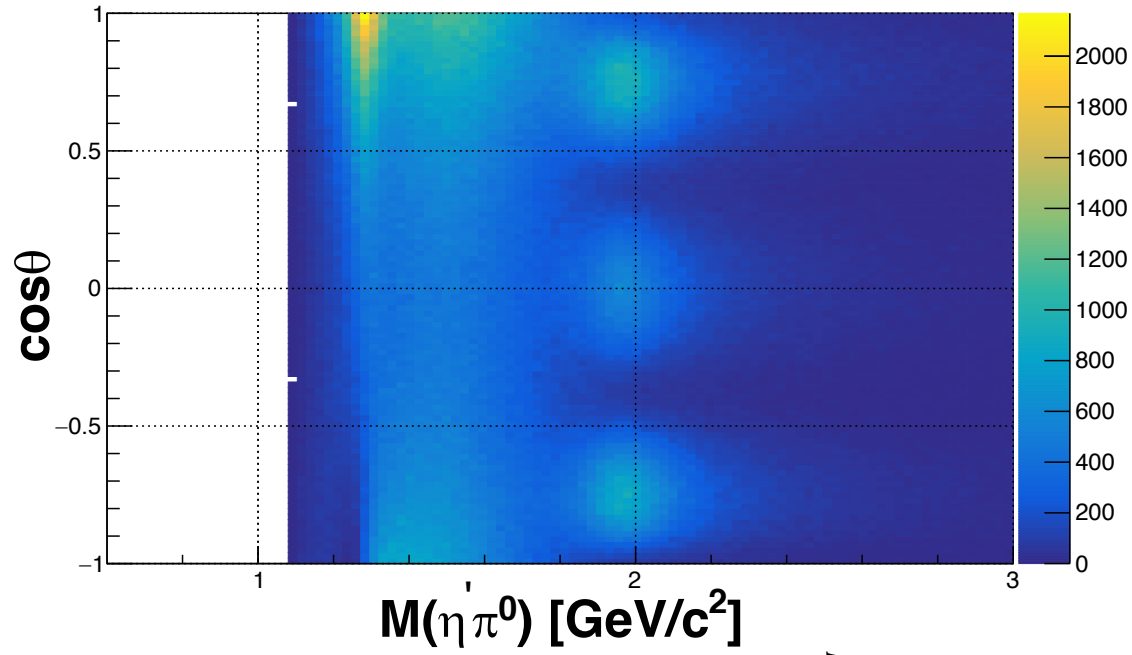
	J	M	$\epsilon$	Real	Imaginary	BW Mass	BW Width
1	0, 1	0, 1	+1	200	200	1.564	0.492
2	0, 1	0, 1	+1	50	50	1.306	0.114
4	2	2	+1	5	0	1.996	0.255

$\Phi = 1.77$  Deg.

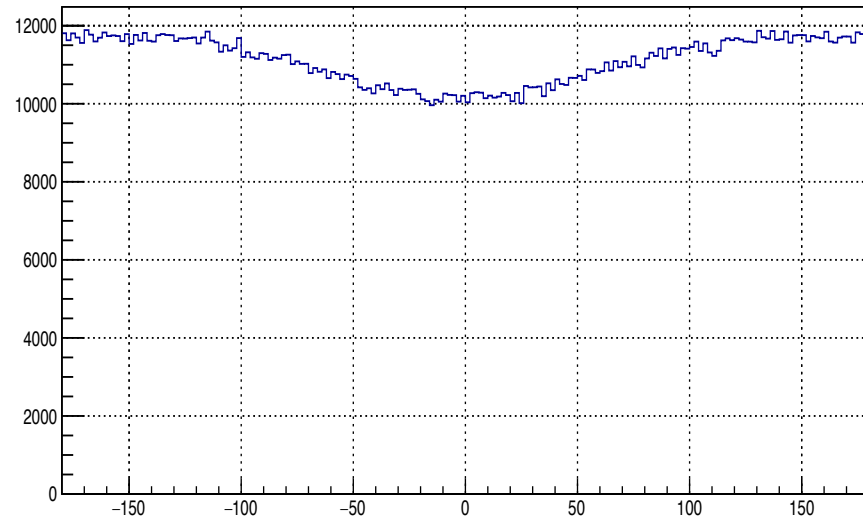
$P_\gamma = 0.3$



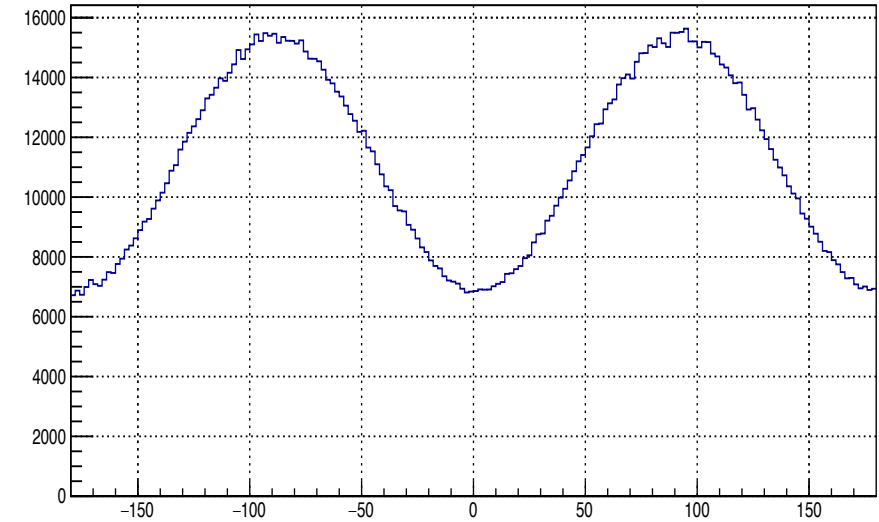
# Generated $2 \cdot 10^6$ ( $p\eta'\pi^0$ ) events with AmpTools



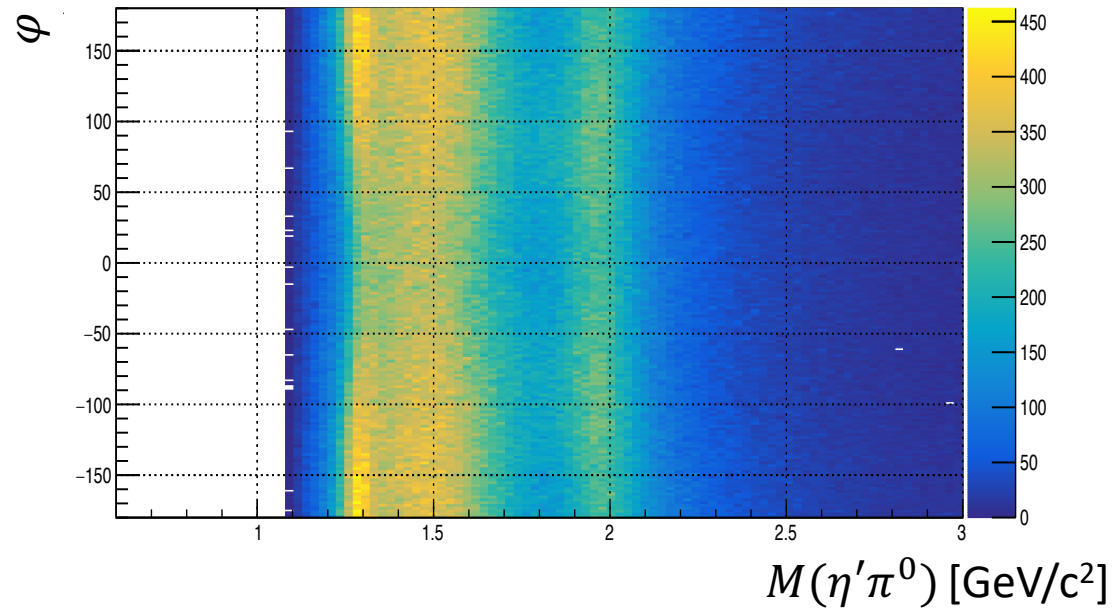
# Generated $2 \cdot 10^6$ ( $p\eta'\pi^0$ ) events with AmpTools



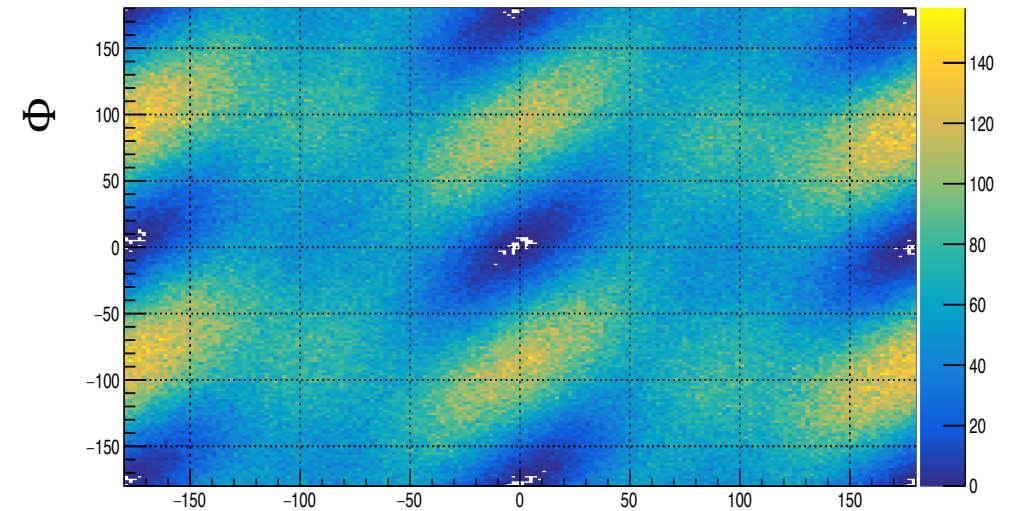
$\varphi$



$\Phi$



$M(\eta'\pi^0)$  [ $\text{GeV}/c^2$ ]



$\varphi$

1. Assume acceptance  $\eta(\theta, \varphi) = 1$  and use same MC sample for both accepted and generated MC.

2. Execute fitting:

```
fit -c Mar_fit_etaprime_polarized.cfg
```

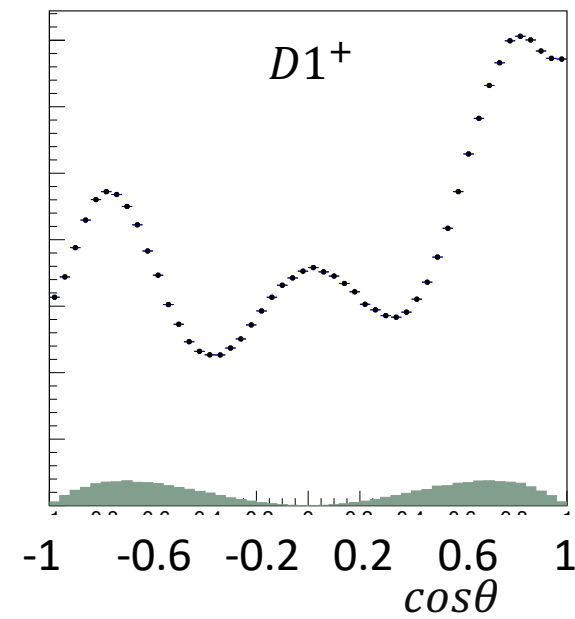
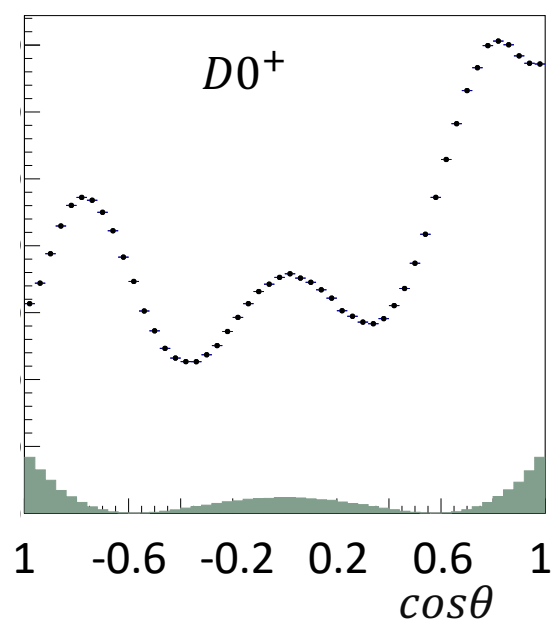
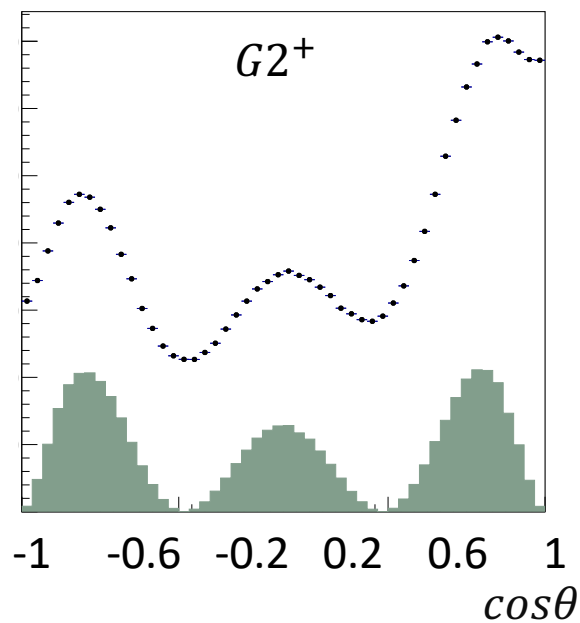
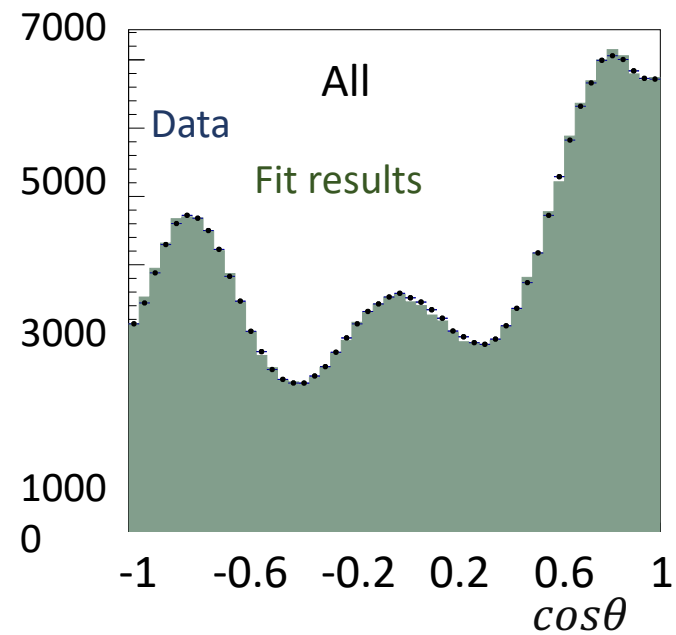
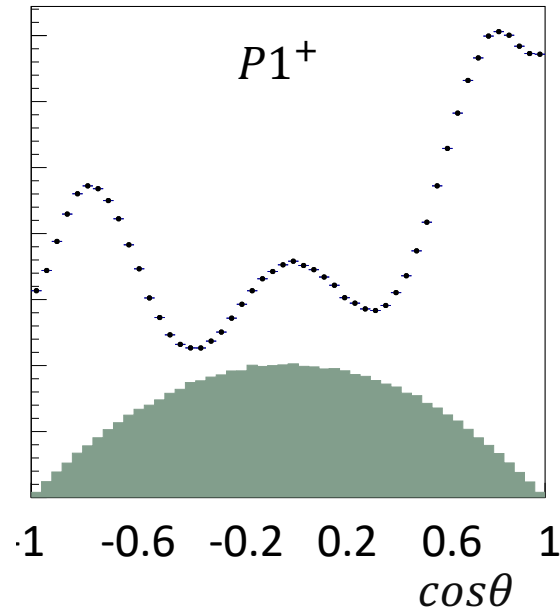
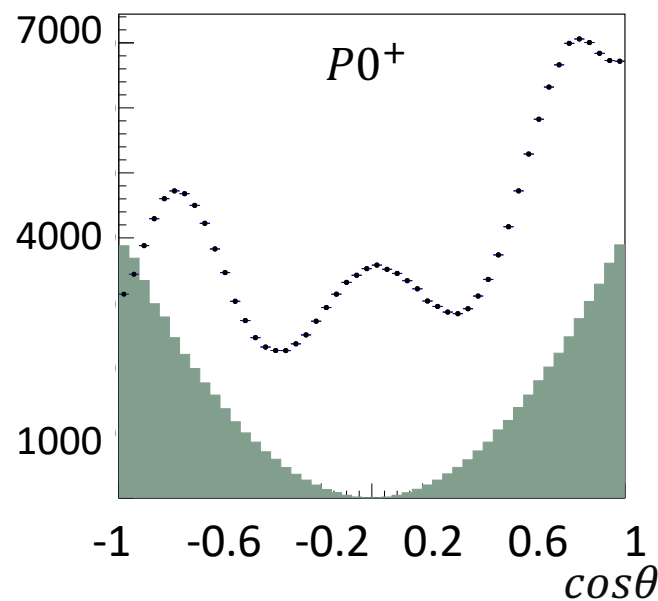
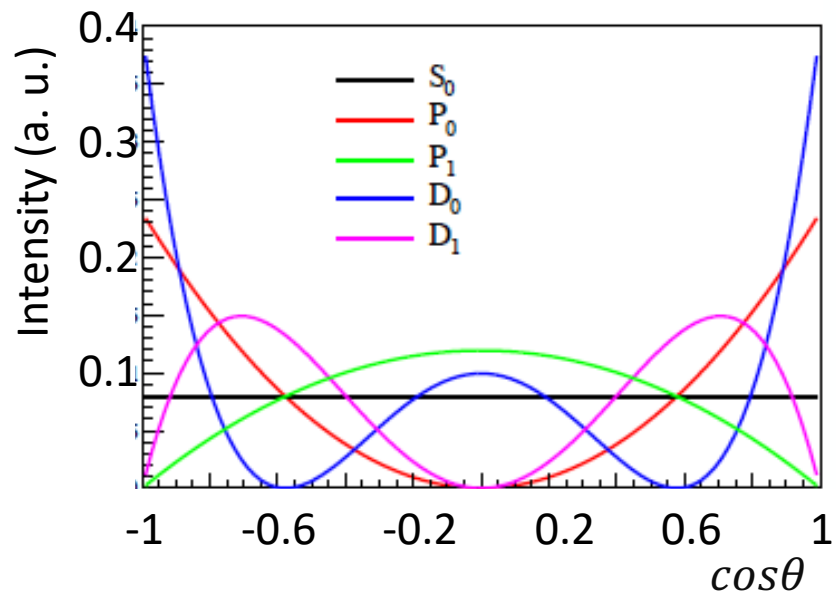
3. To plot the results in GUI:

```
twopi_plotter_mom etaprimepi0.fit -g
```

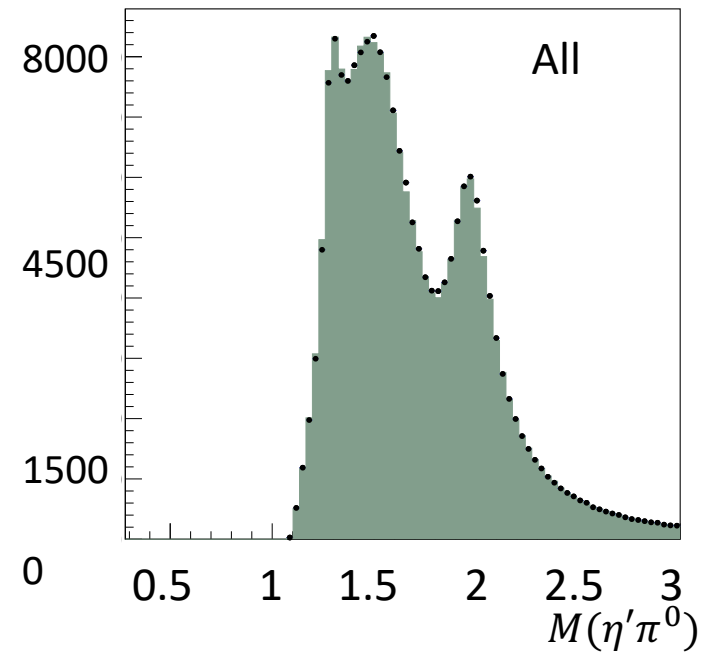
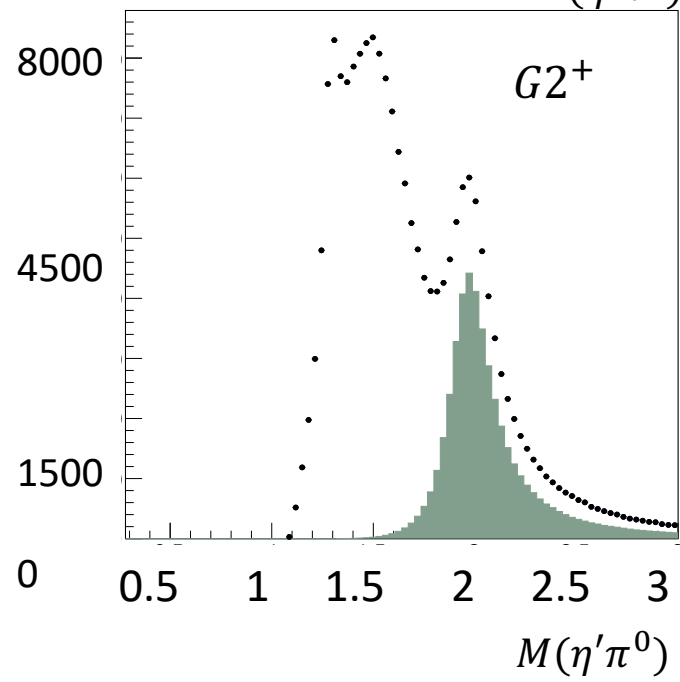
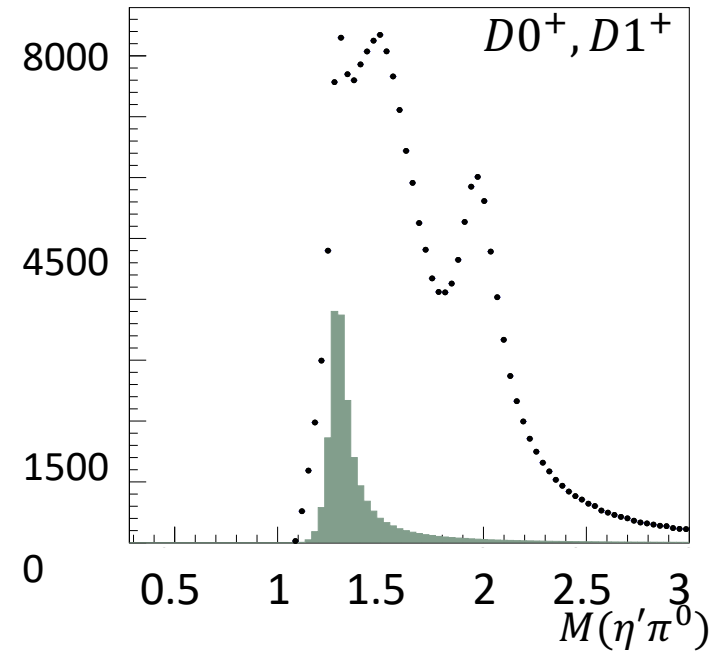
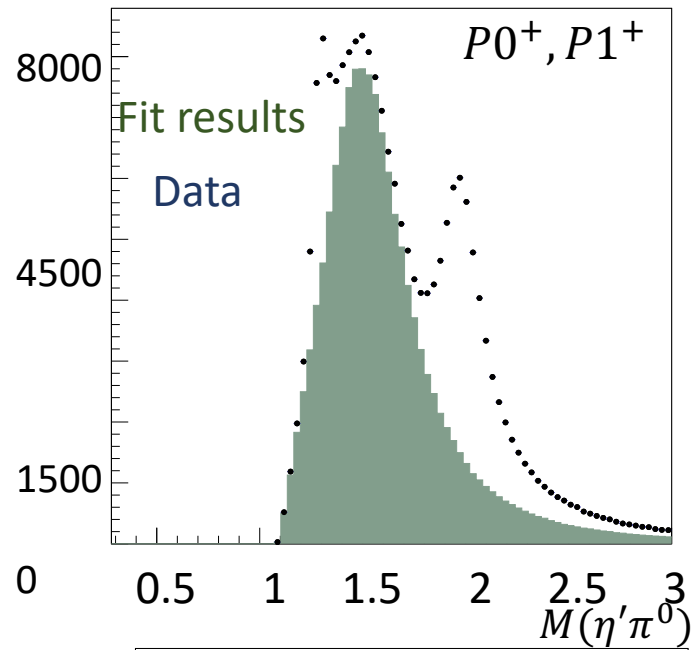
# Results with $\cos\theta$

Amplitudes used in fitting are  $D_0^+$ ,  $D_1^+$ ,  $P_0^+$ ,  $P_1^+$ ,  $G_2^+$

Fit results



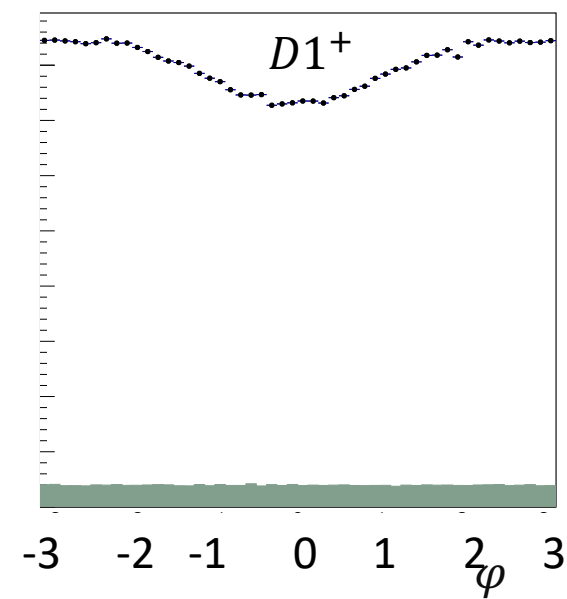
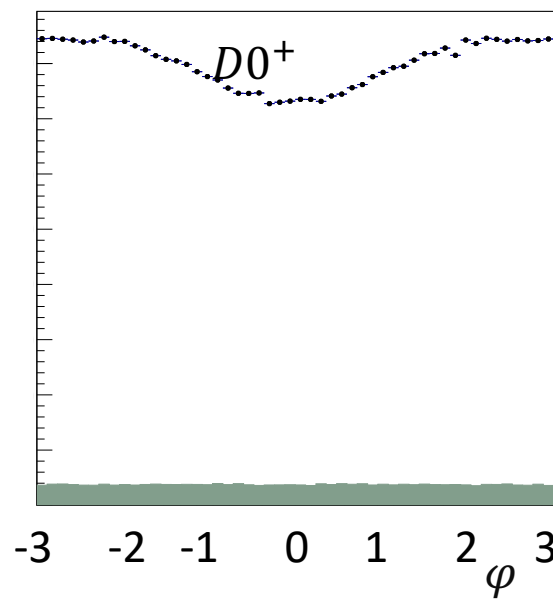
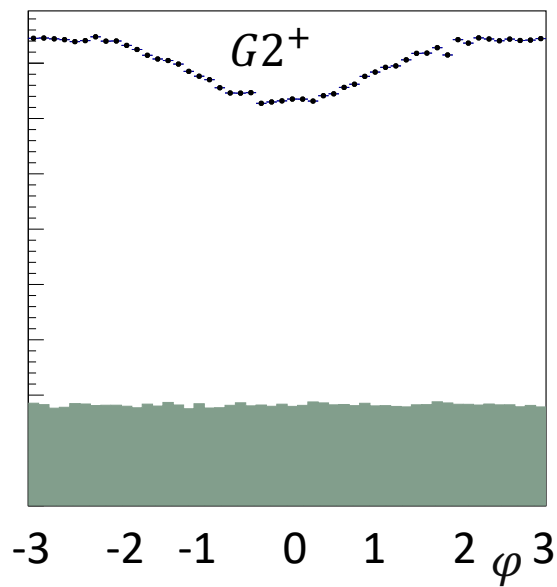
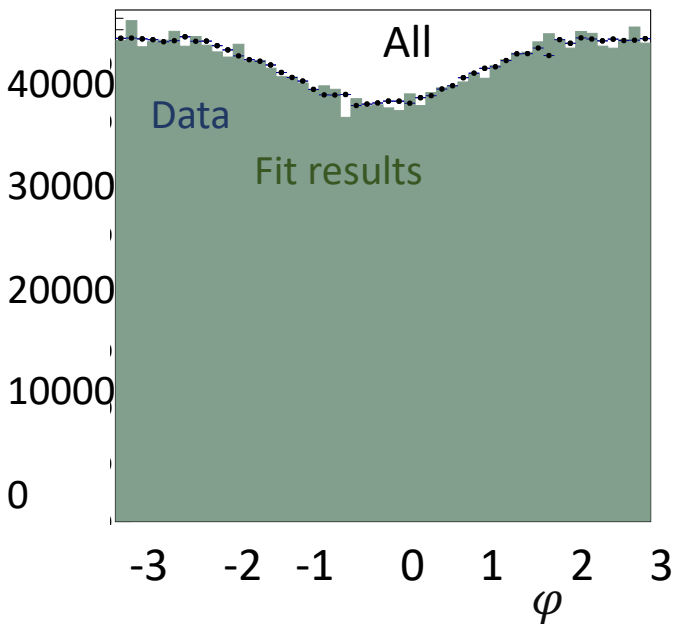
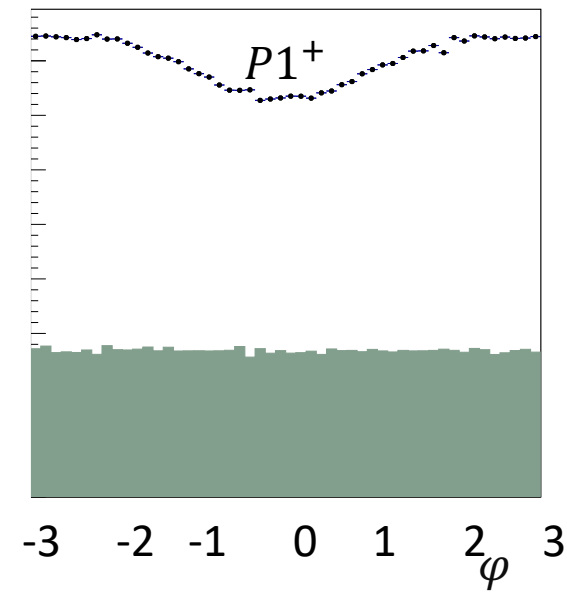
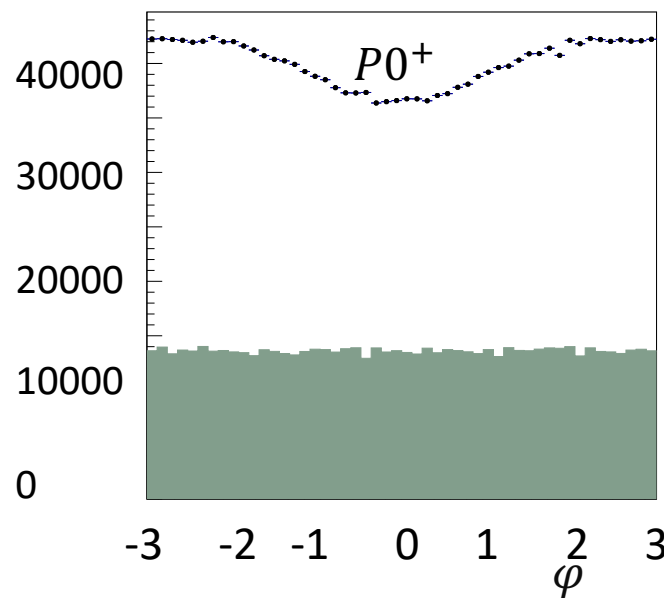
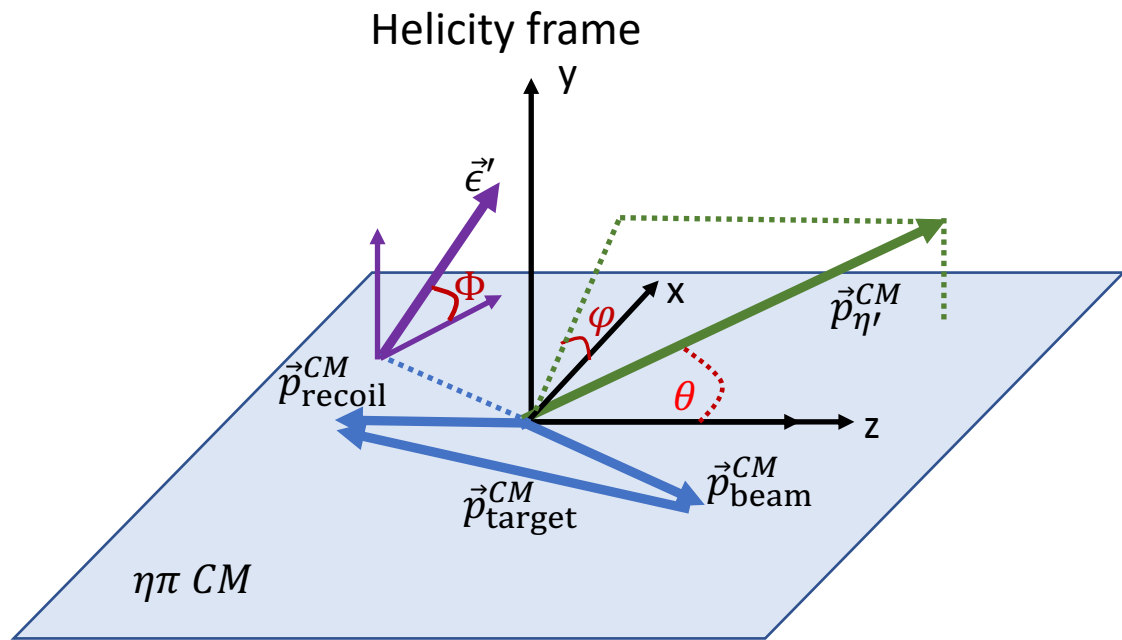
# Results in invariant mass of $\eta'\pi^0$



# Results with $\varphi$

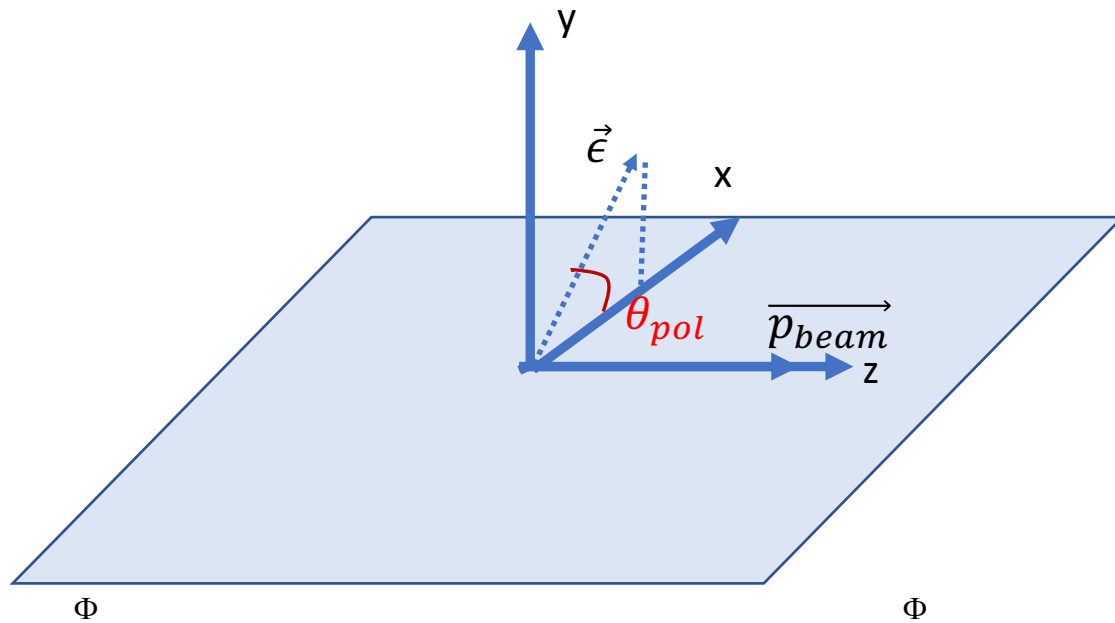
Amplitudes used in fitting are  $D0^+$ ,  $D1^+$ ,  $P0^+$ ,  $P1^+$ ,  $G2^+$

Fit results





Lab frame



$\theta_{pol}=1.7$  Deg.

$\epsilon(\cos(\theta_{pol}), \sin(\theta_{pol}), 0);$

$\Phi = \arctg(\vec{y} \cdot \vec{\epsilon}, \vec{p}_{beam} \cdot (\vec{\epsilon} \times \vec{y}));$

$\Phi$

$\Phi$

$\Phi$

