PWA Challenge

Florida International University 2020

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Generated 4*10^6 ($p\eta\pi^0$)events with AmpTools

Generated amplitudes are

- S0/a0 (980 MeV)
- D1/a2 (1320 MeV)
- P1/π_1(1400 MeV) (exotic)
- G1/a_2' (1700)

J-Spin
M-absolute value of spin projection along z axis
ϵ-reflectivity

J	M	ε	Real	Imaginary	BW Mass	BW Width
0	0	-1	2000	0	0.98	0.075
1	1	+1	60	140	1.354	0.330
2	1	+1	1000	0	1.318	0.111
4	1	+1	0	20	1.995	0.257

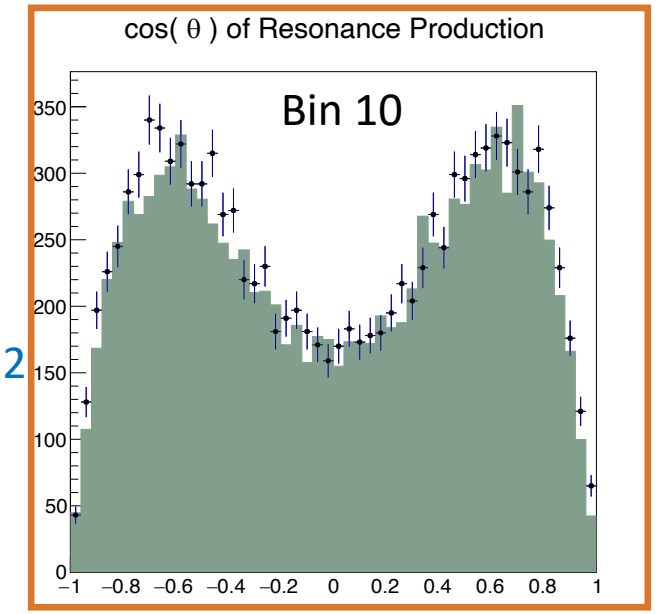
Results with fitting in different bins of invariant mass of $\eta\pi^0$ and t

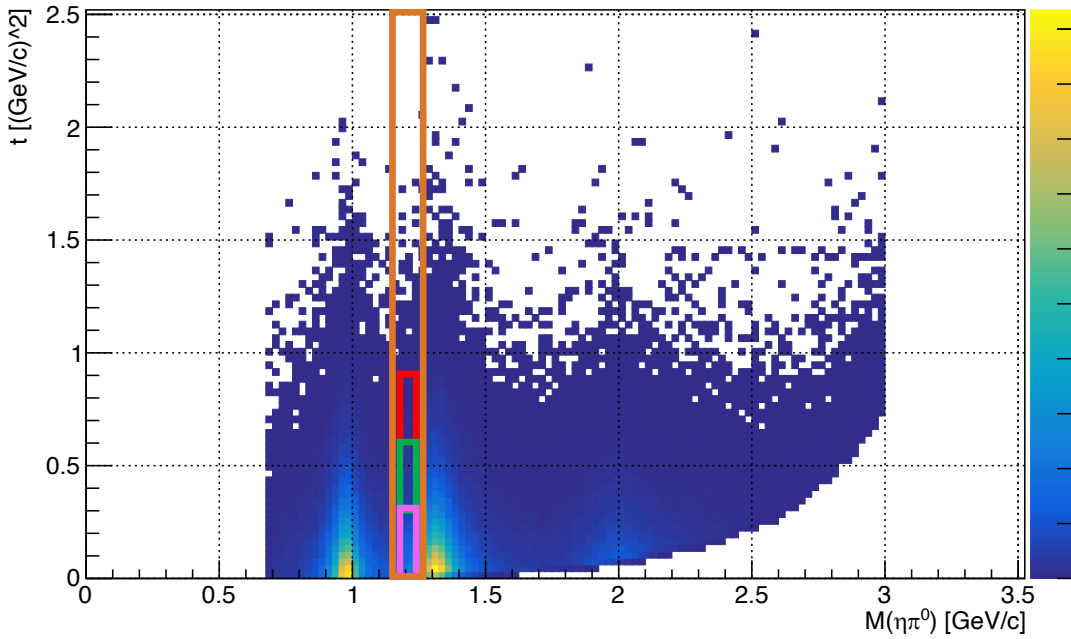
D1+

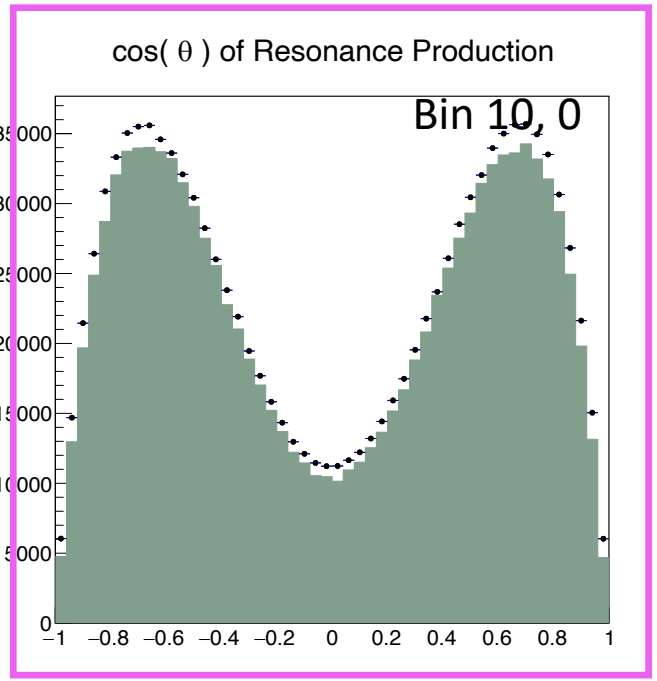
Bin M , t

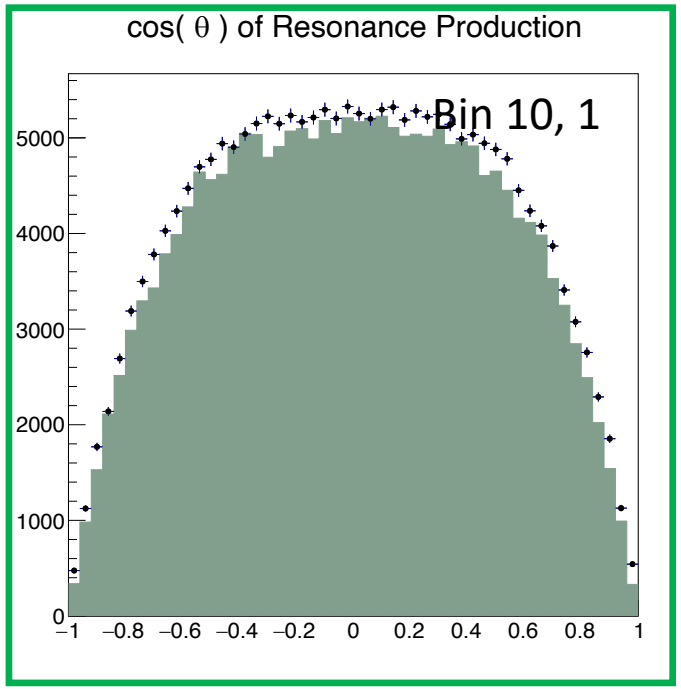
$M(\eta\pi^0)$ range from 0.7 to 3
N bins=45
Bin width≈ 0.051

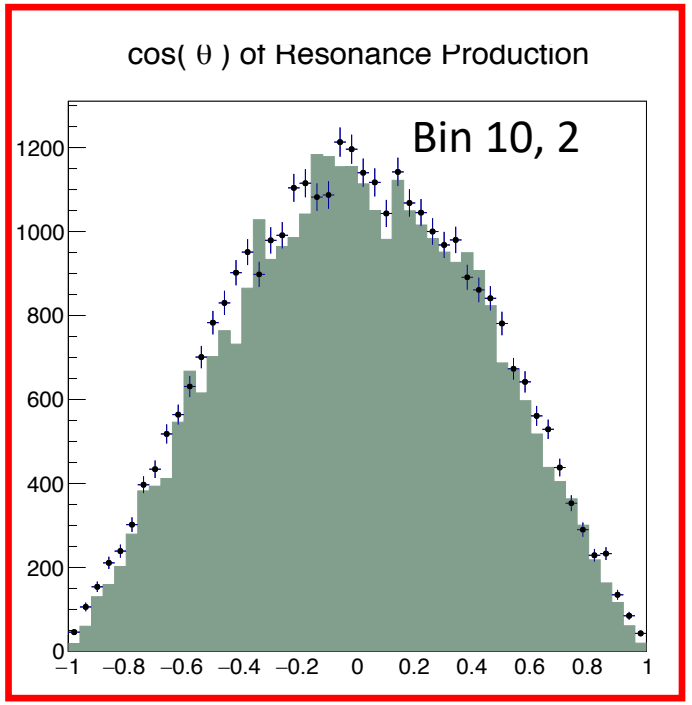
t range from 0 to 1.2
N bins=4
Bin width≈ 0.3







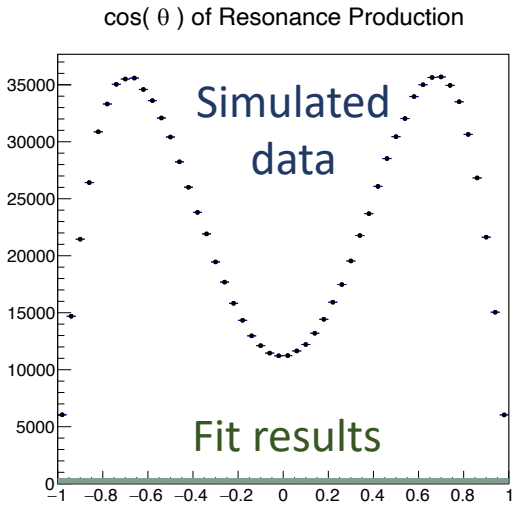




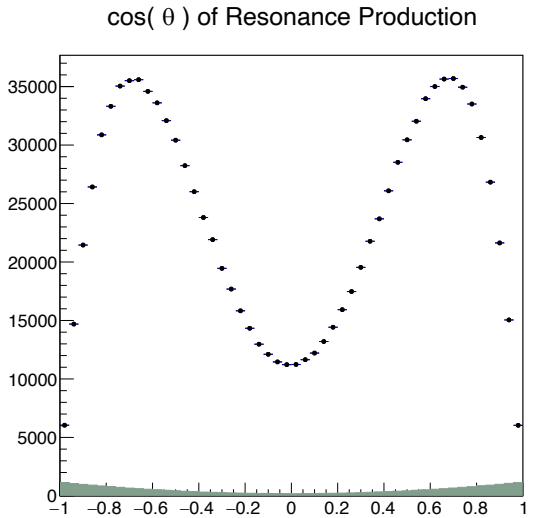
Results with fitting in different bins of invariant mass of $\eta\pi^0$ and t ($4*10^6$ events)

Bin 10, 0

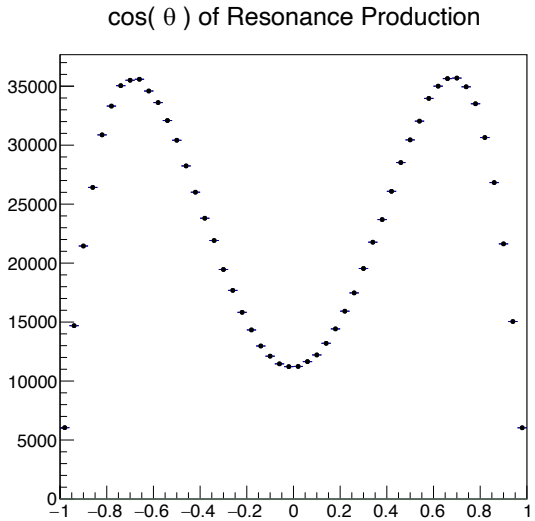
S0-



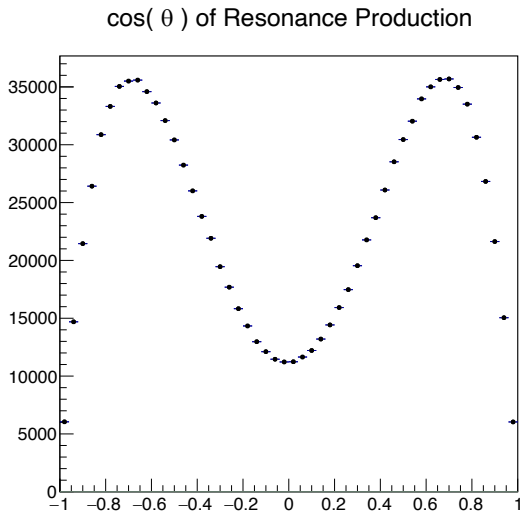
P0-

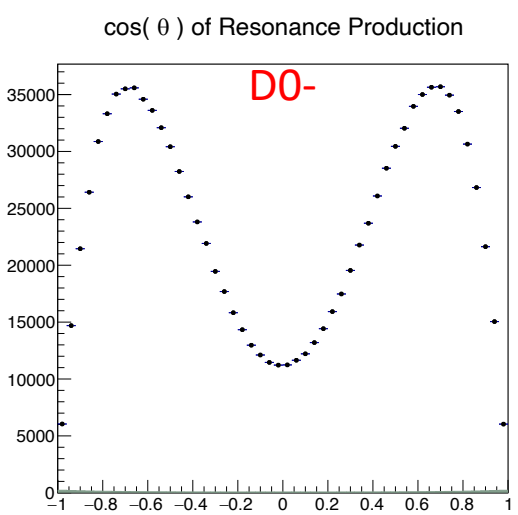


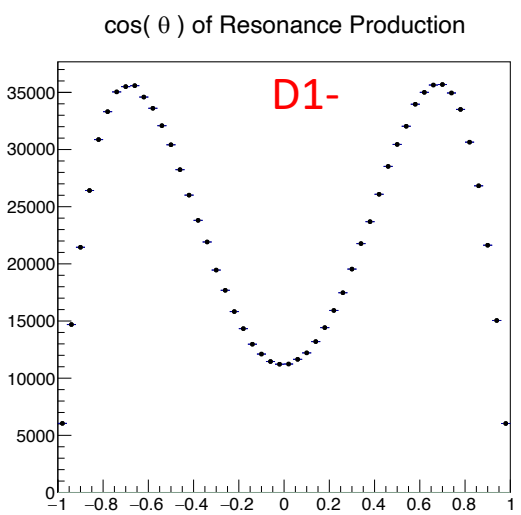
P1-

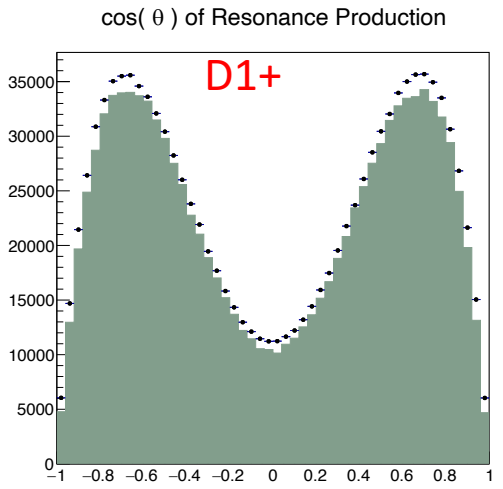


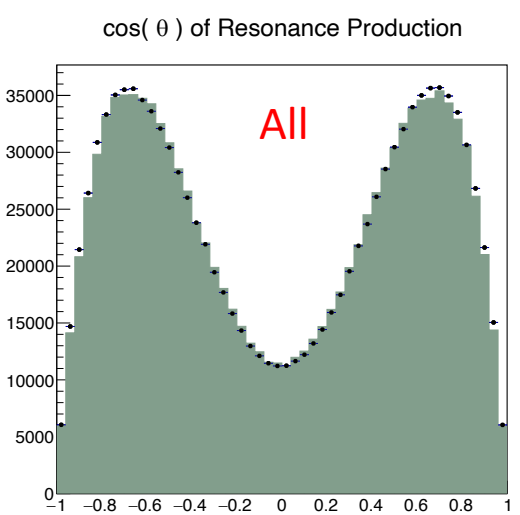
P1+







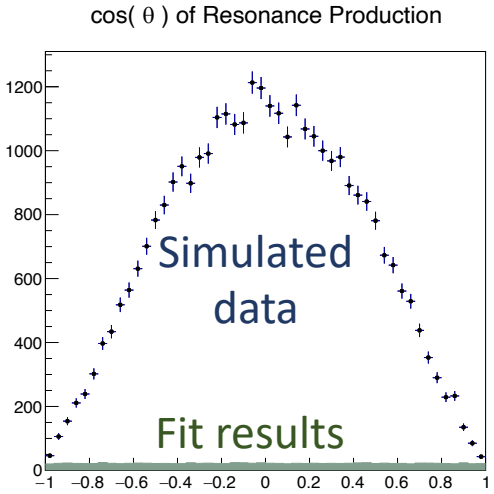




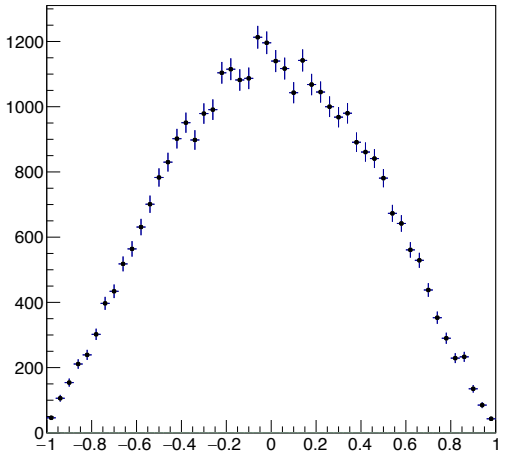
Results with fitting in different bins of invariant mass of $\eta\pi^0$ and t *(4*10⁶ events)*

Bin 10, 2

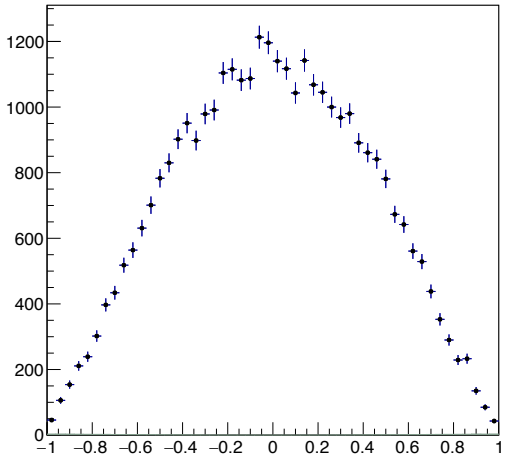
S0-



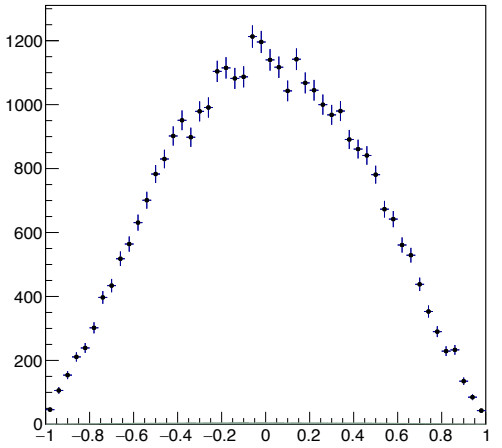
P0-



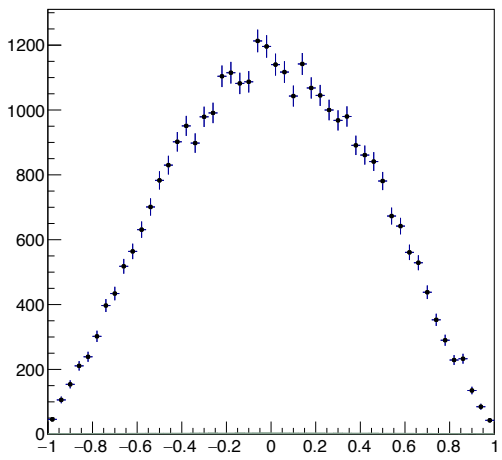
P1-



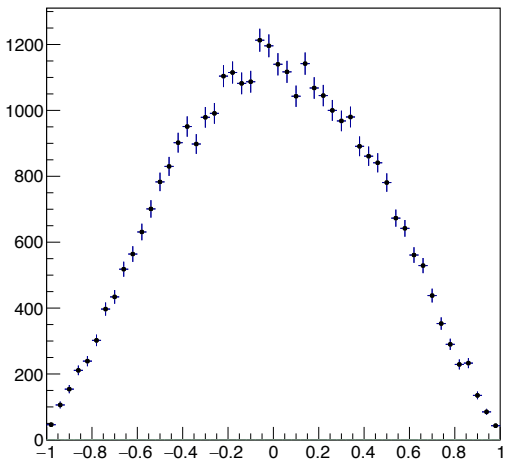
P1+



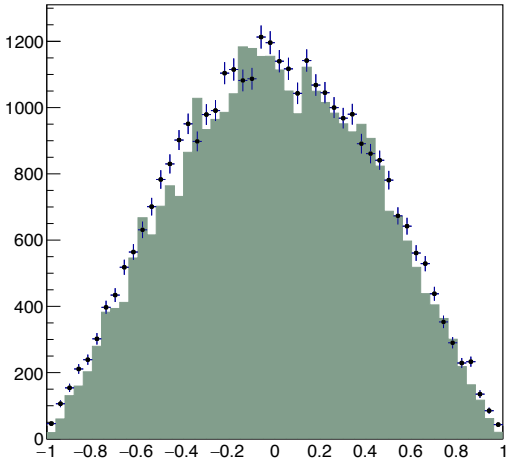
D0-



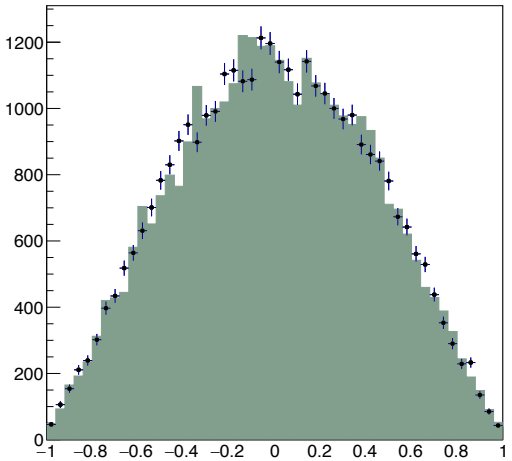
D1-



D1+



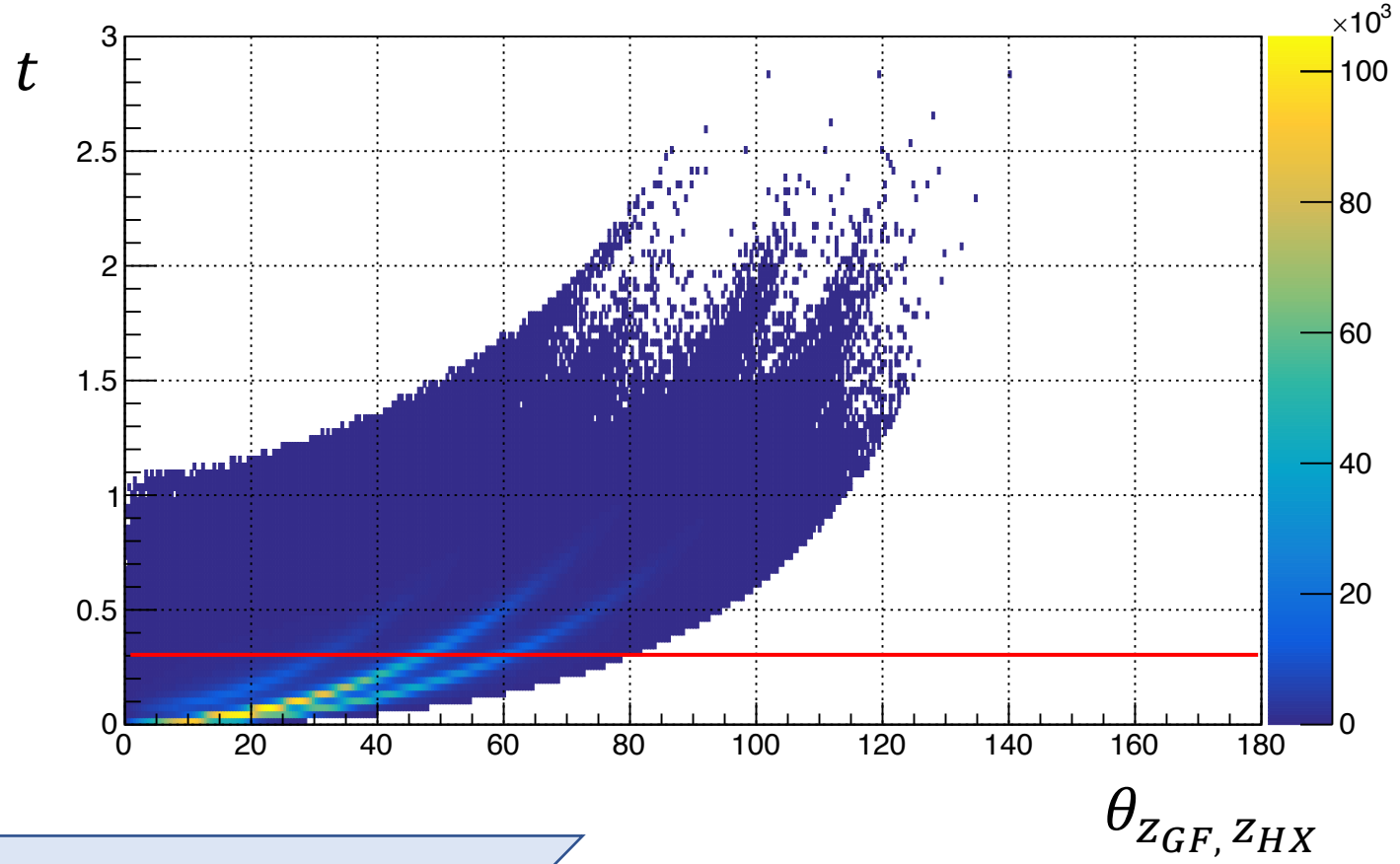
All

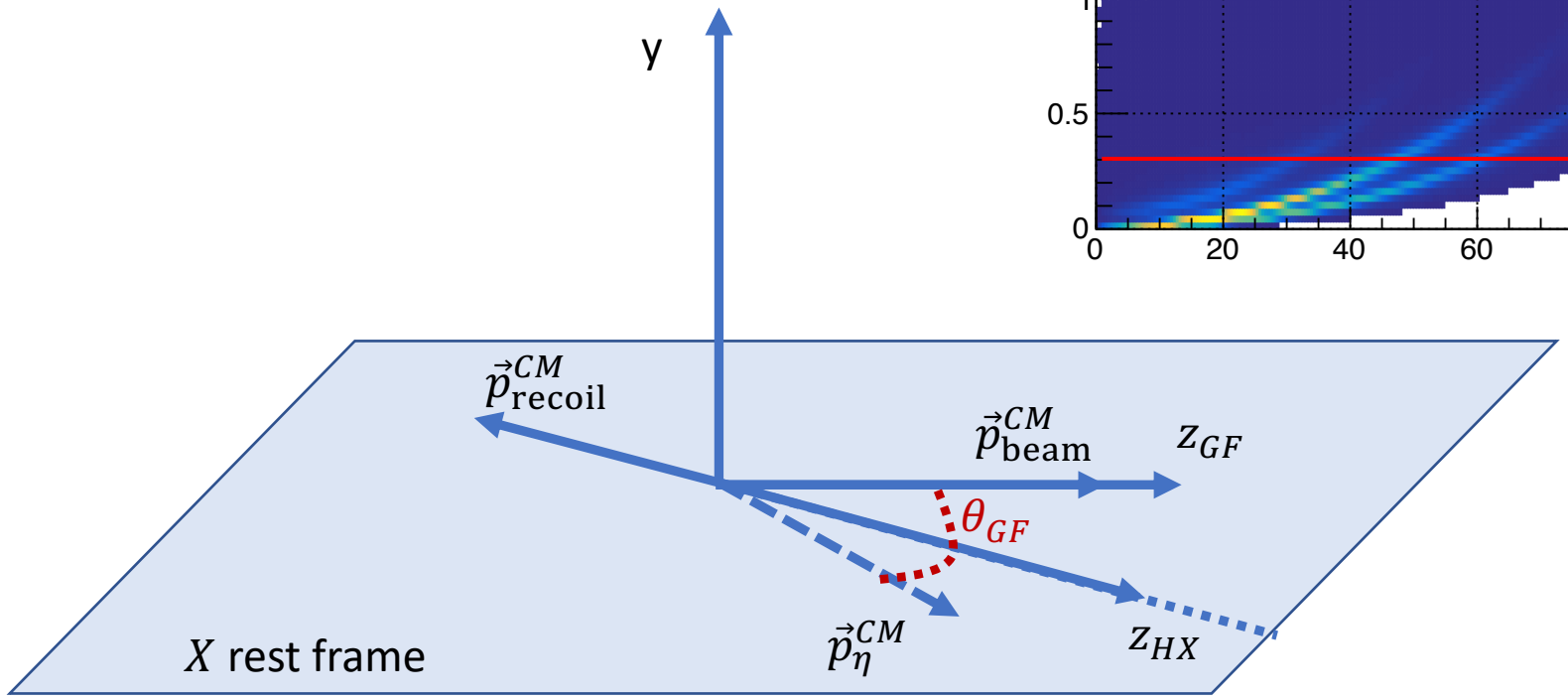


Gottfried-Jackson(GJ) and Helicity (HX) frames

$$\gamma p \rightarrow p \underbrace{\eta\pi^0}_{X}$$

$$t\text{=-}(p_\gamma - p_{\eta\pi})^2$$





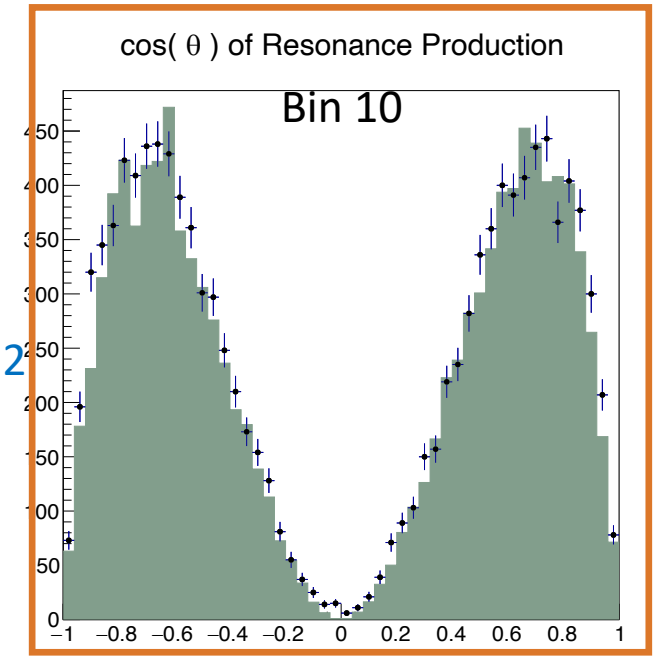
Results with fitting in different bins of invariant mass of $\eta\pi^0$ and *t in* G-J frame

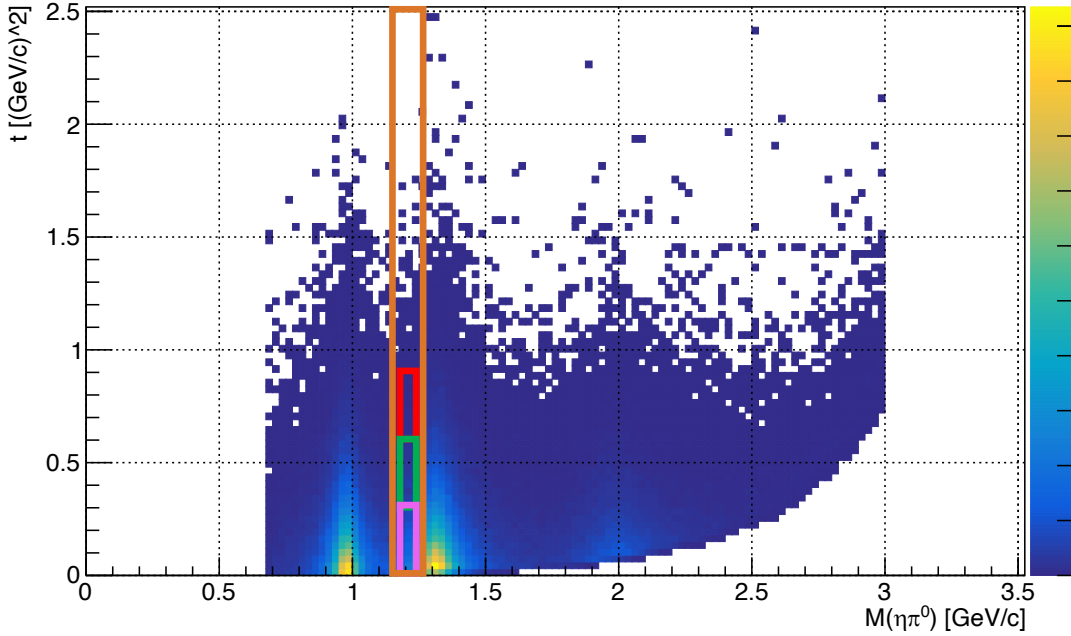
D1+

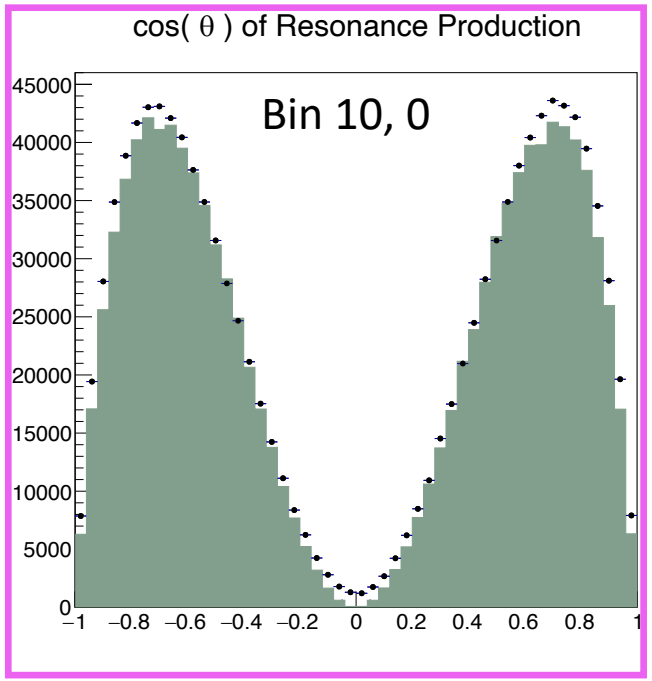
Bin M , t

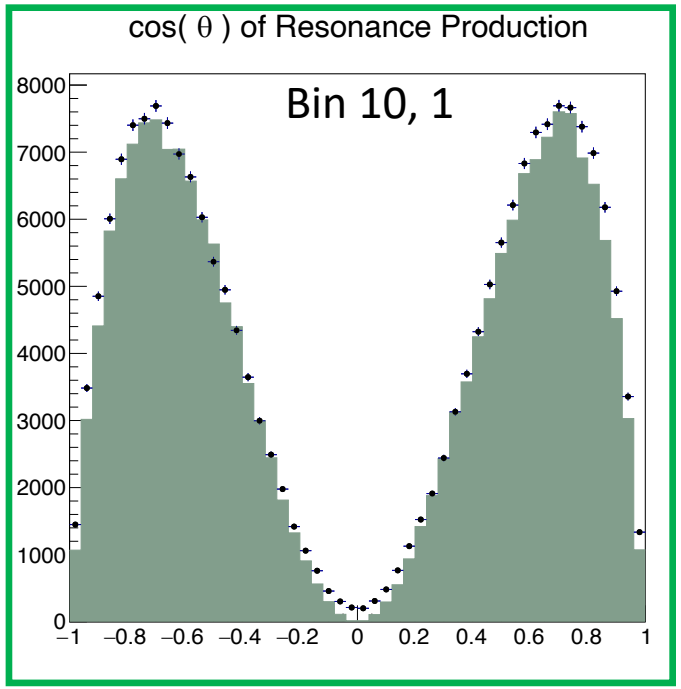
M($\eta\pi^0$) range from 0.7 to 3
N bins=45
Bin width≈ 0.051

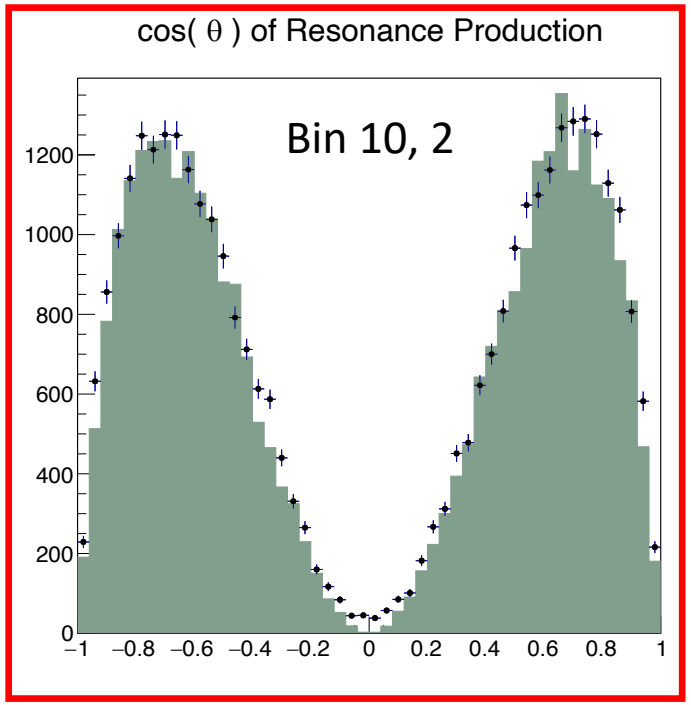
t range from 0 to 1.2
N bins=4
Bin width≈ 0.3





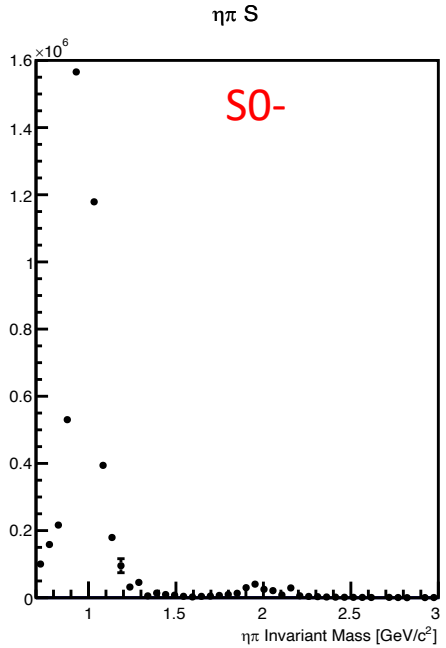


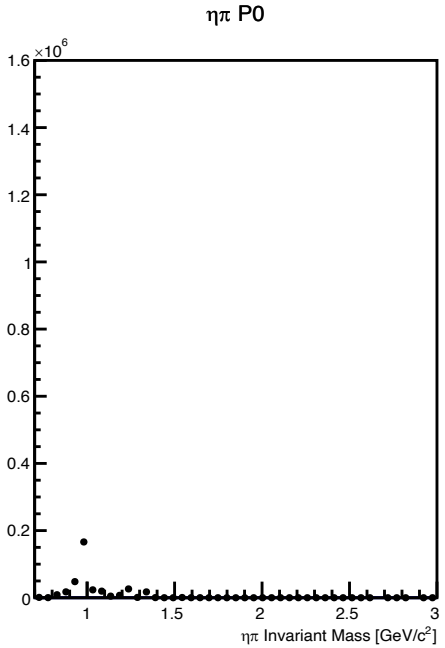


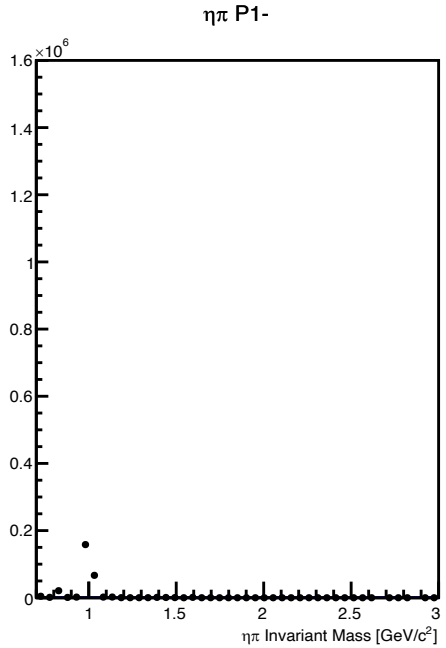


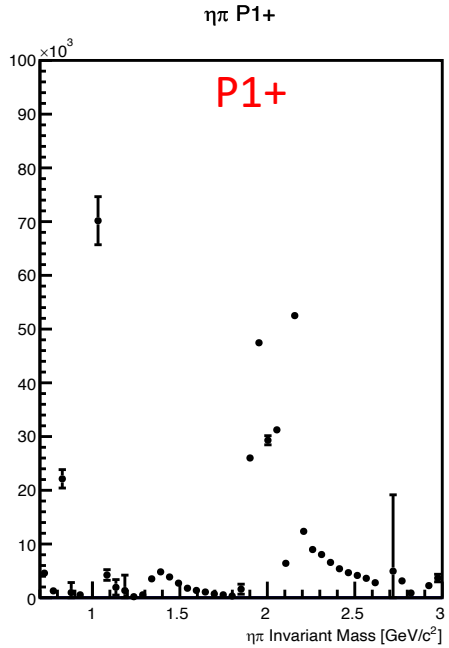
Results with fitting in different bins of invariant mass of $\eta\pi^0$ and t ($4*10^6$ events)

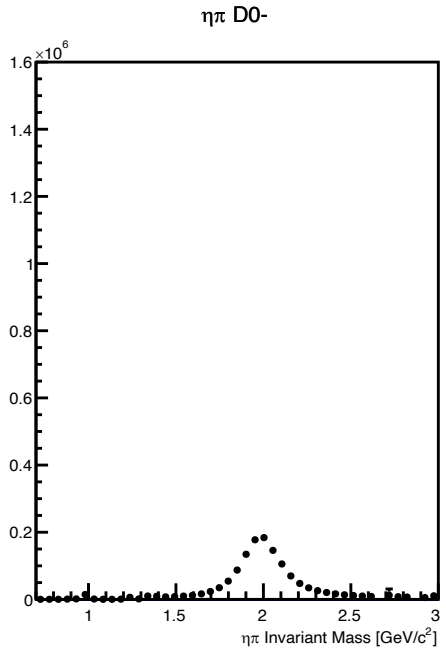
All bins

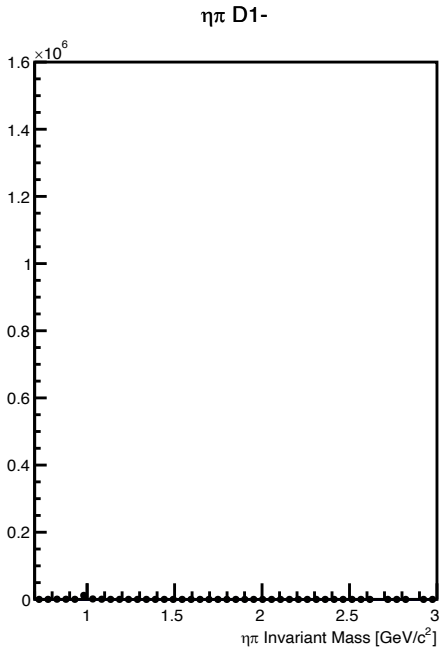


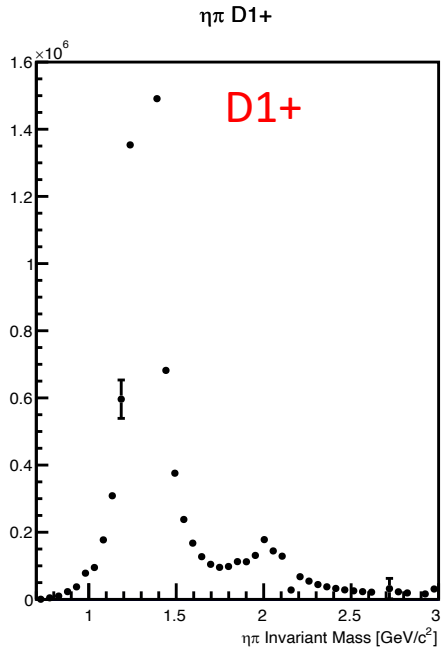


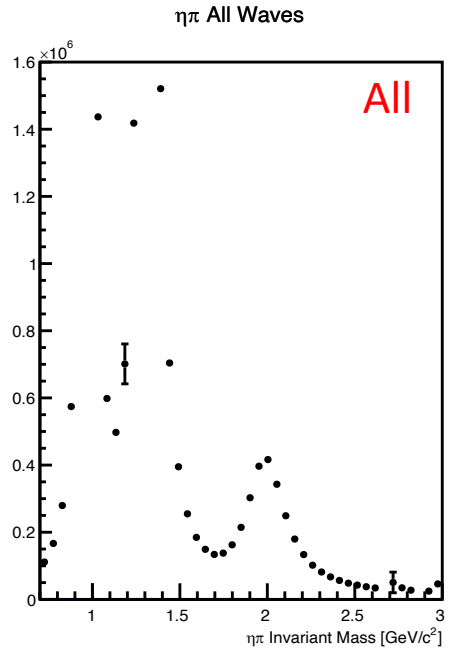








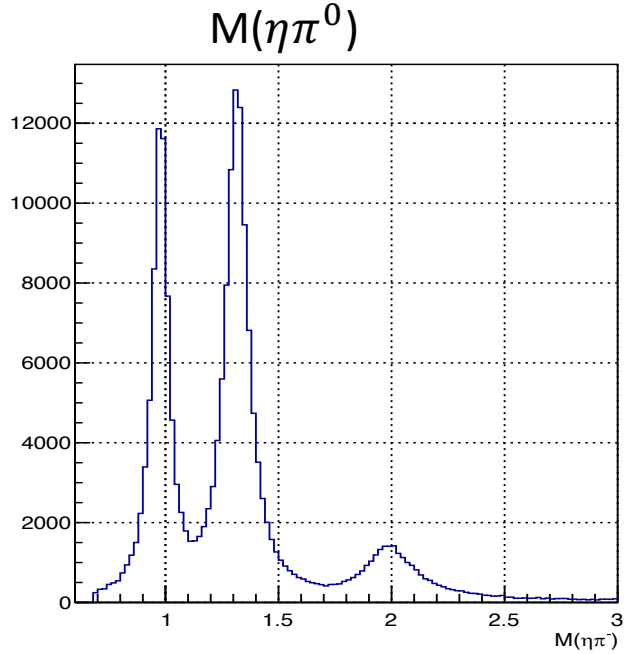




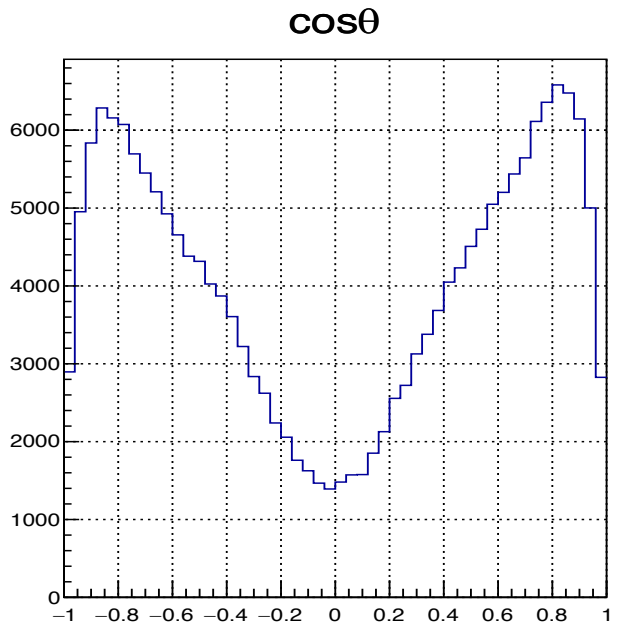
Backup slides

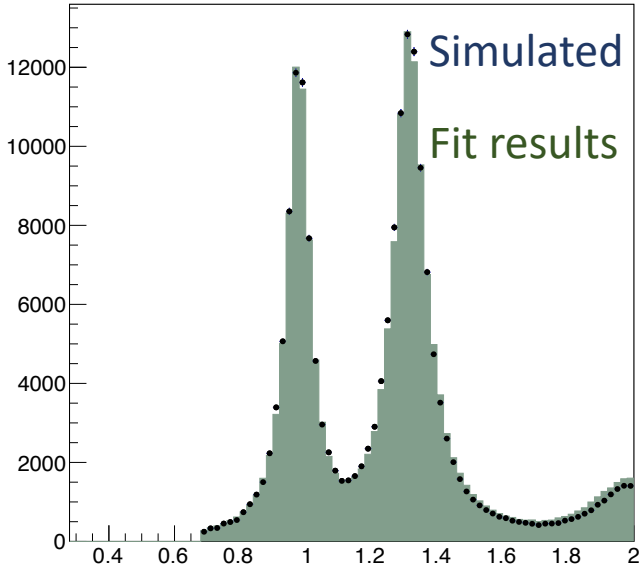
The invariant mass of generated $\eta\pi^0$

All

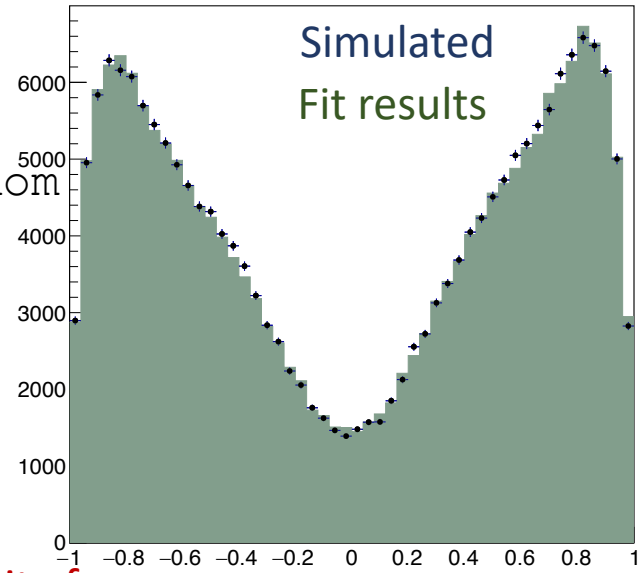


Plotted using the data file





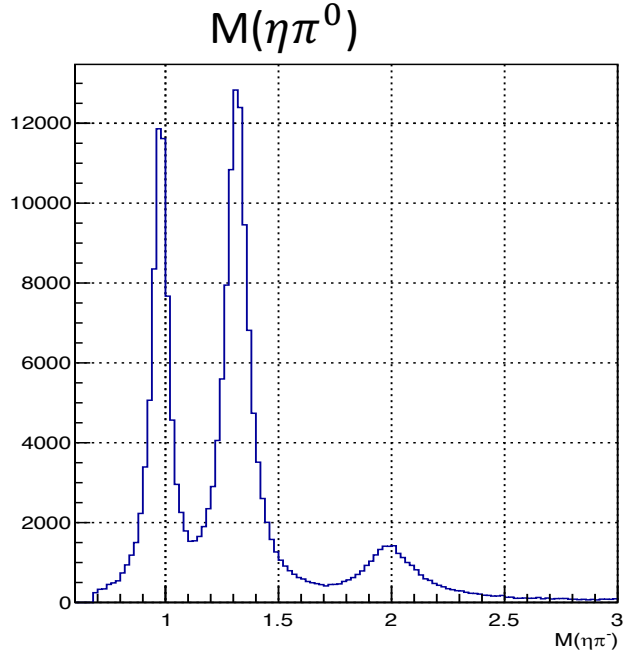
plotted with twopi_plotter_mom



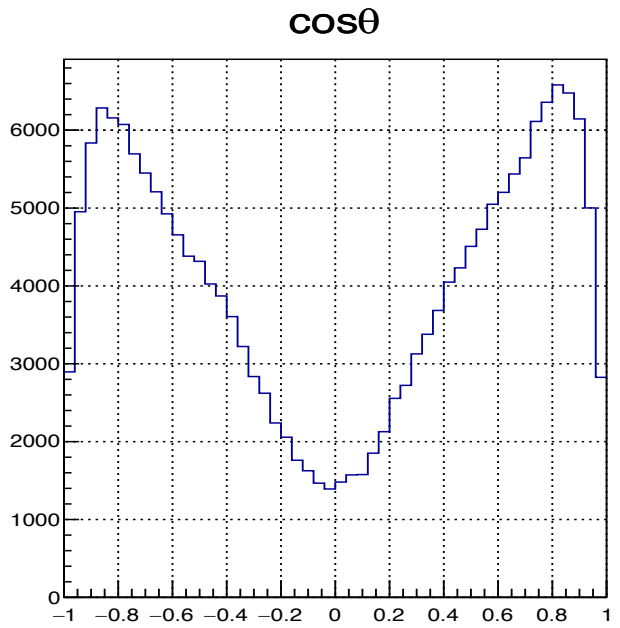
Solution: The twopi_plotter_mom library was ploting angular distributions in helicity frame

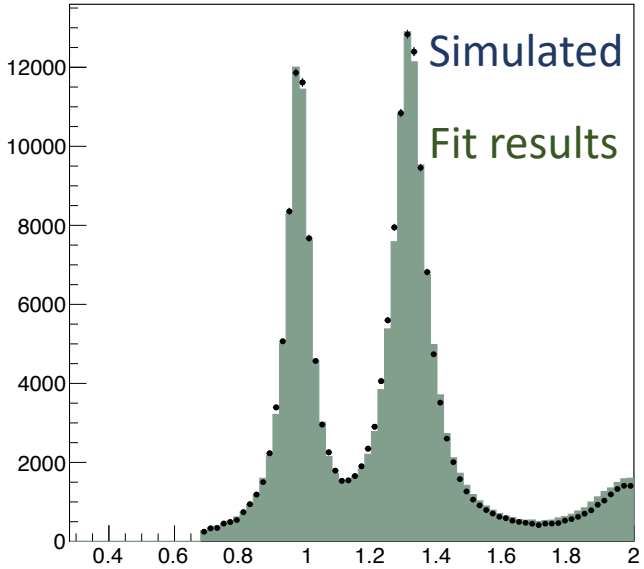
The invariant mass of generated $\eta\pi^0$

All

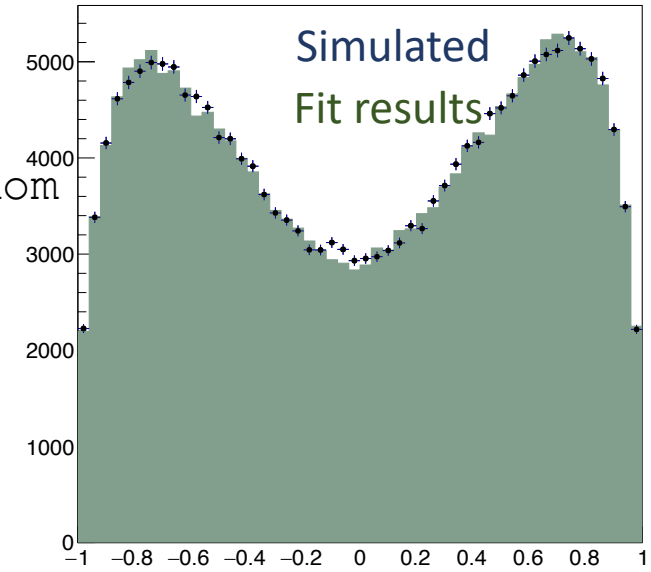


Plotted using the data file





plotted with twopi_plotter_mom



Problem : Agular distributions plotted with different codes look different