PWA Challenge

Florida International University 2020

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Generated $(p\eta\pi^0)$events with AmpTools

Generated amplitudes are

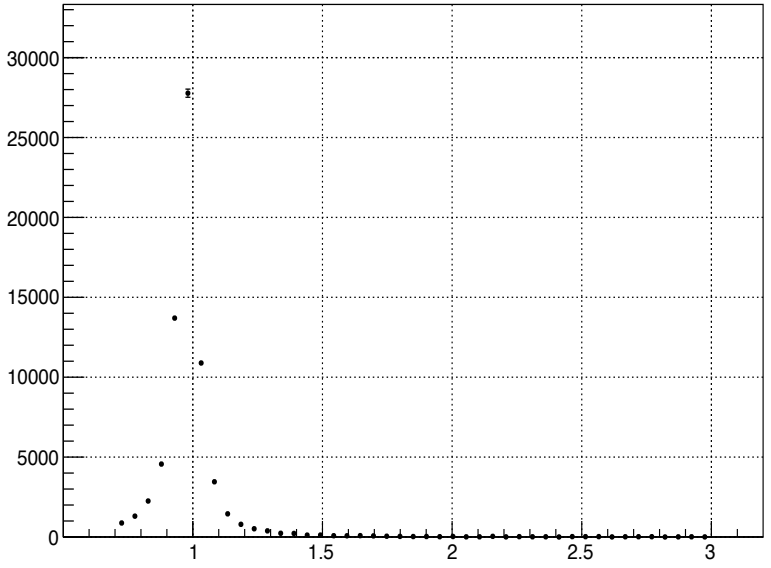
- S0/a0 (980 MeV)
- P1/π_1(1400 MeV) (exotic)
- D1/a2 (1320 MeV)
- G1/a4 (1.995)

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

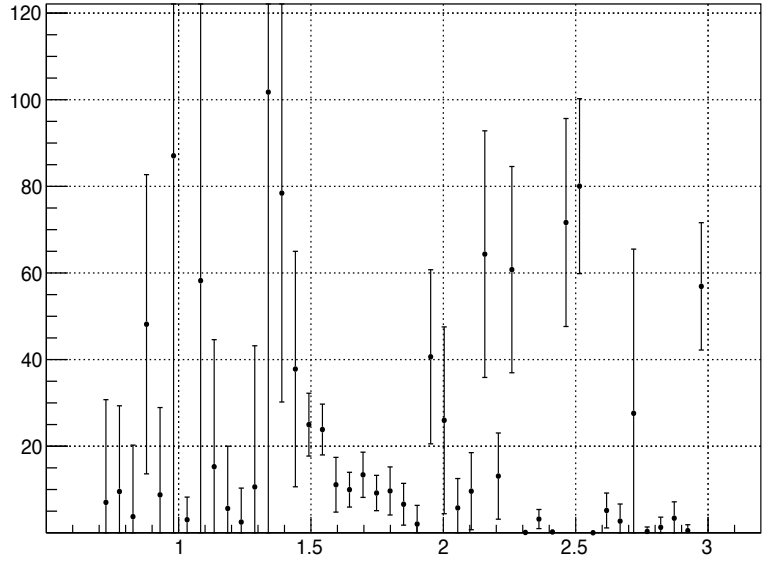
J	M	ε	Real	Imaginary	BW Mass	BW Width
0	0	-1	2000	0	0.98	0.075
1	1	+1	60	140	1.354	0.330
2	1	+1	1000	0	1.318	0.111
4	1	+1	0	20	1.995	0.257

Uncertainties from AMPTOOLS (MINUIT) for intensities from fitting in different M bins

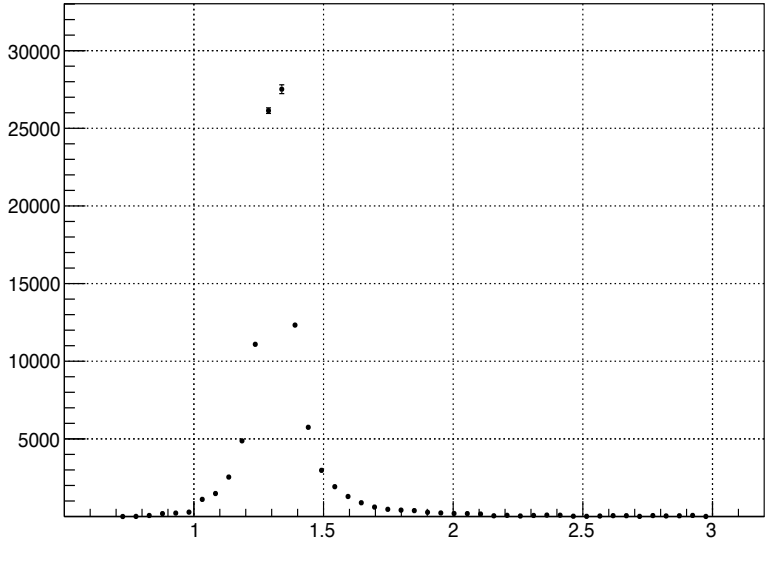
S0mi



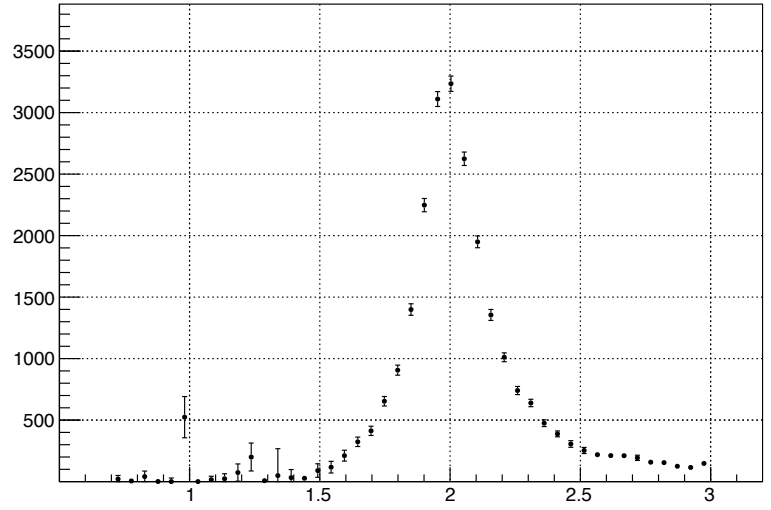
P1pl



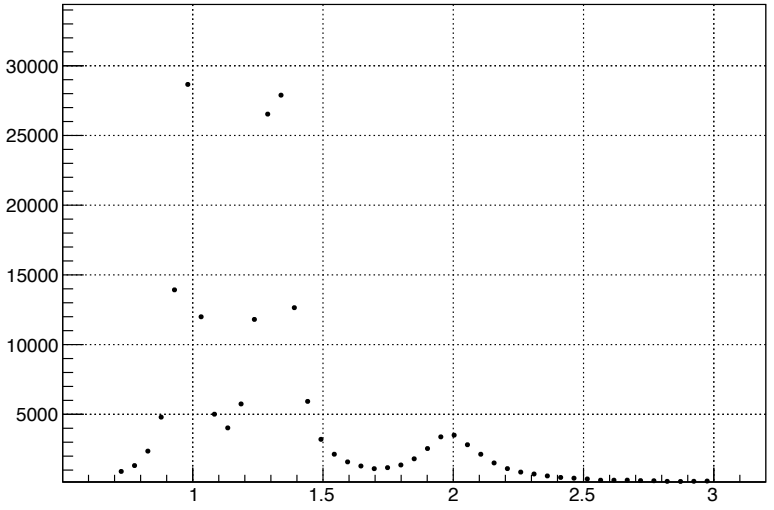
D1pl



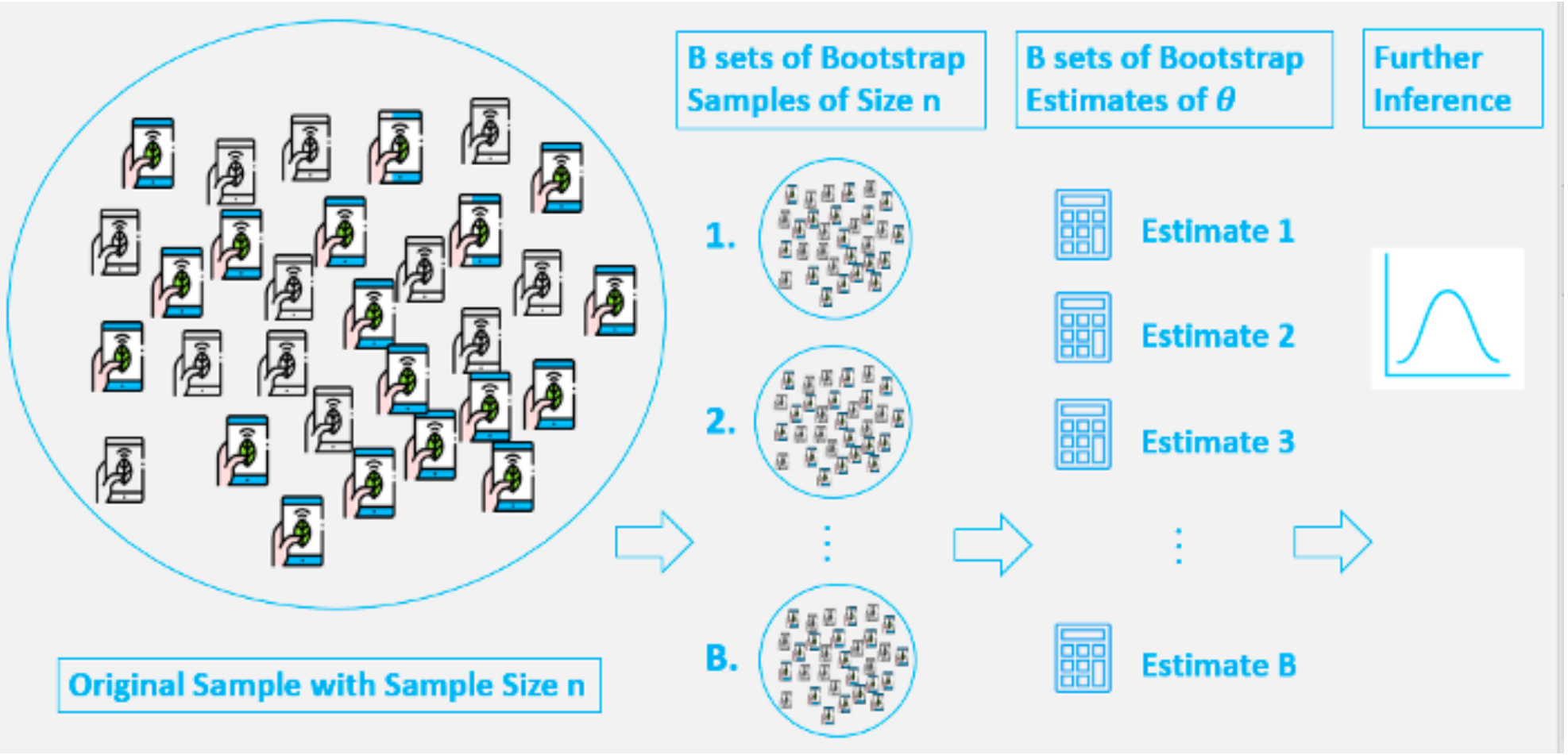
G1pl



All waves



Bootstrapping

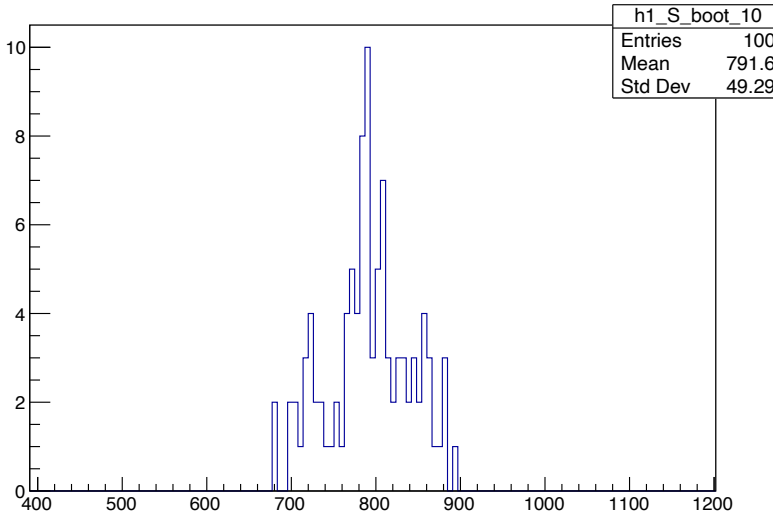


1.A sample from population with sample size n.
2.Draw a Bootstrap Sample from the original sample data with replacement with size n
3.Evaluate ϑ for each Bootstrap Sample, and there will be totally B estimates of ϑ.
4.Construct a sampling distribution with these B Bootstrap statistics and use it to make further statistical inference, such as:

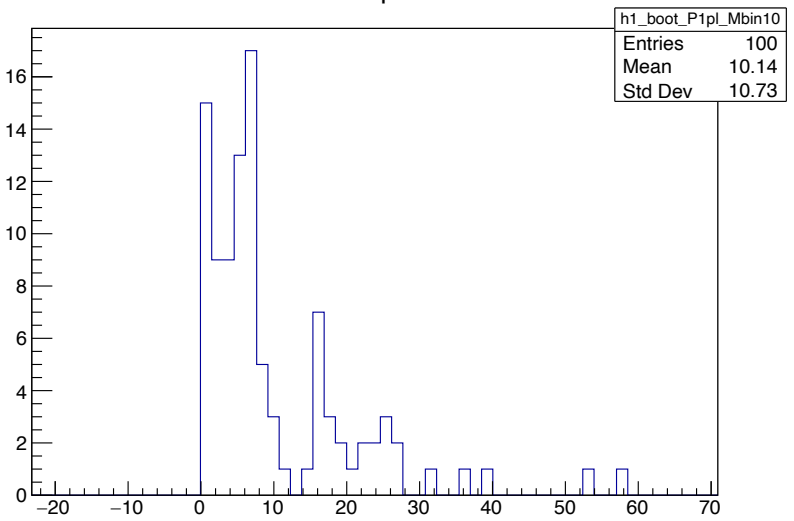
•Estimating the standard error of statistic for ϑ.

Intensity distributions from fitting 100 bootstrapping samples in M=1.2 GeV/c bin

S0 wave



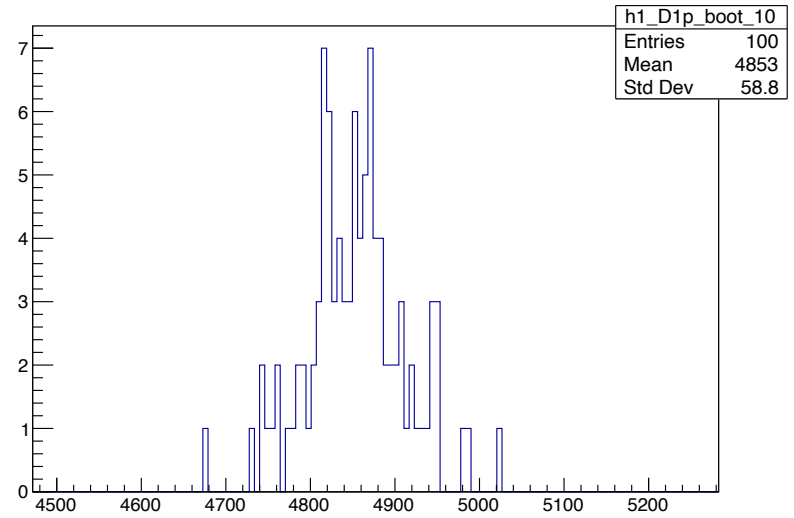
P1pl



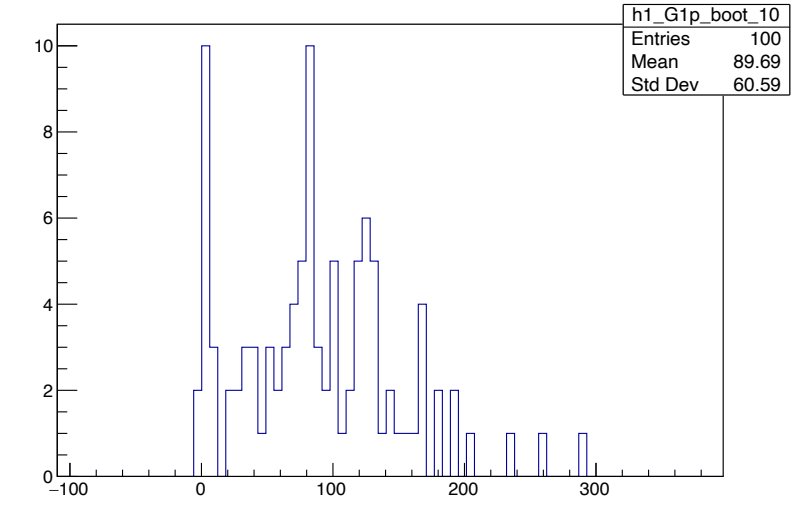
$$\sigma = \sqrt{\frac{\sum_i^B (I_i - I_{mean})^2}{B}}$$

B- number of Bootstraps (100 in this case)

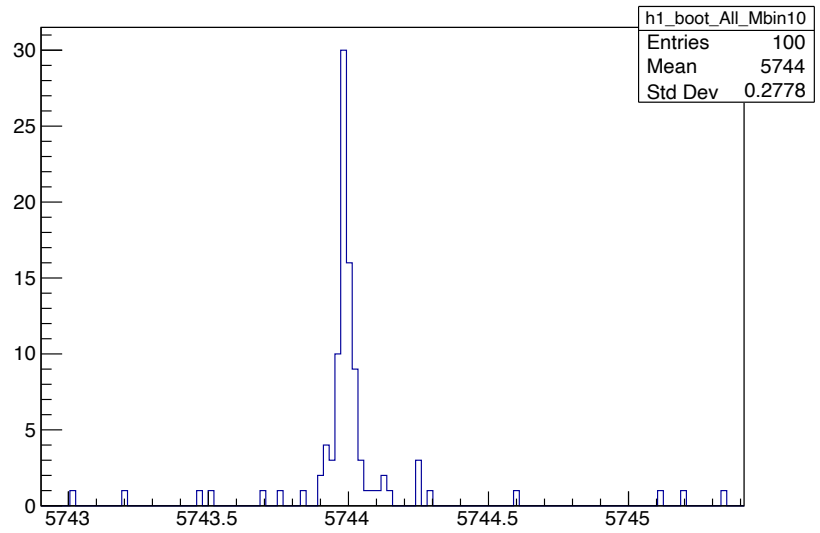
D1+ wave



G1+ wave

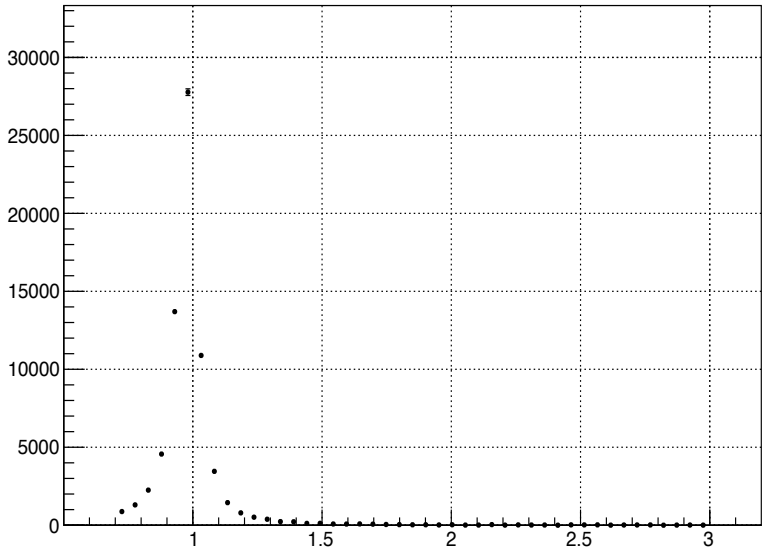


All waves

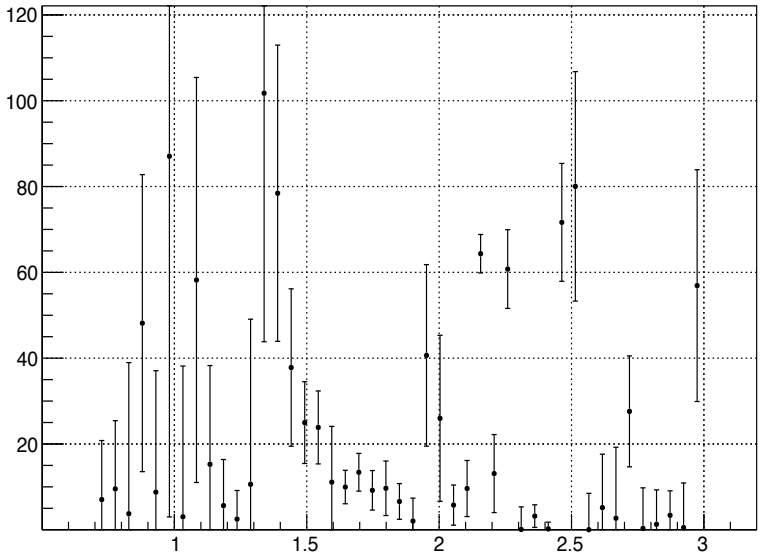


Uncertainties from Bootstrapping for intensities from fitting in different M bins

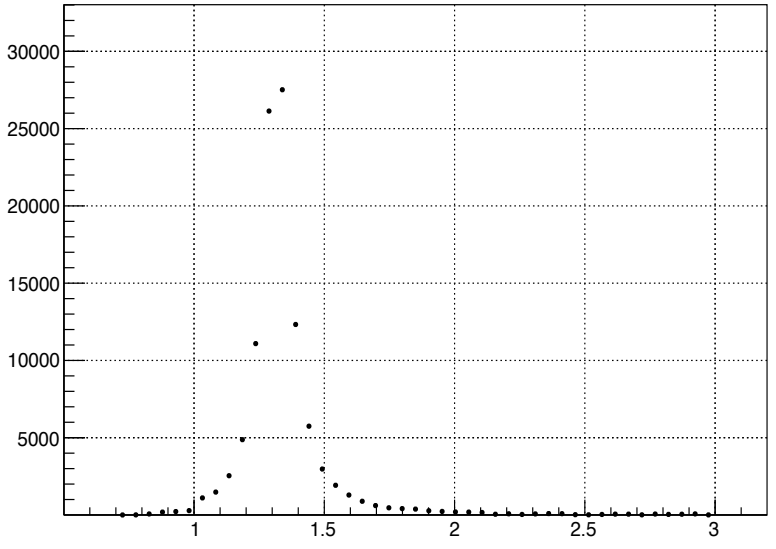
S0mi



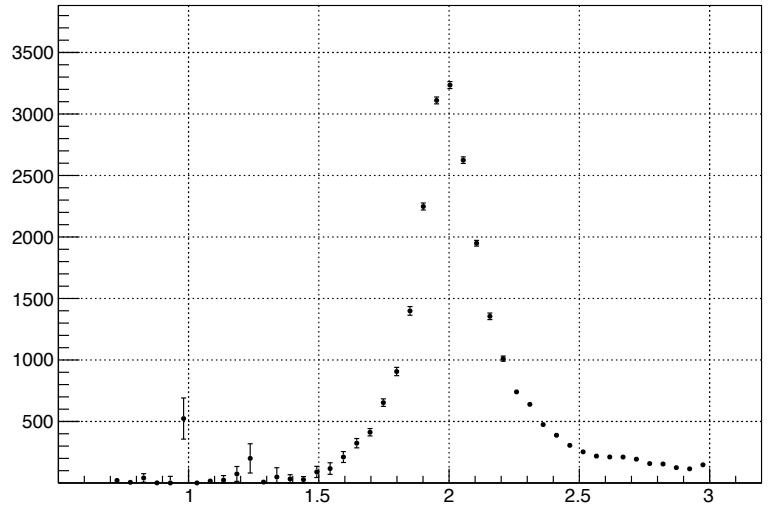
P1pl



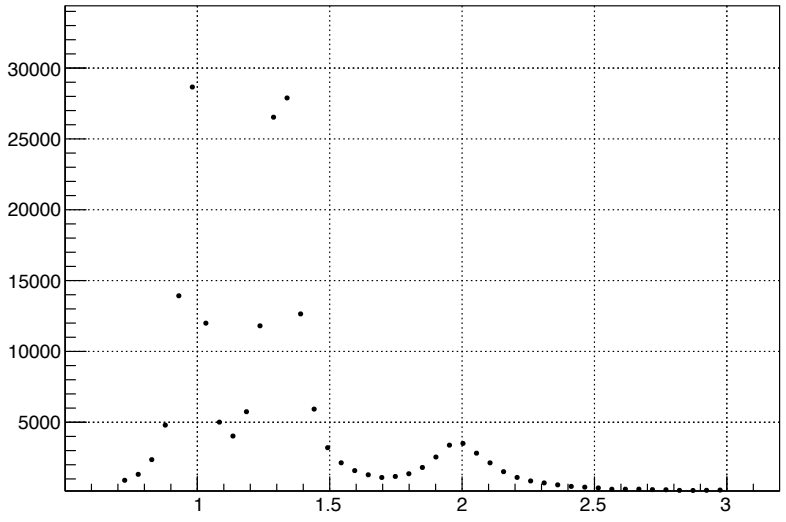
D1pl



G1pl



All waves



$$\sigma = \sqrt{\frac{\sum_i^B (I_i - I_{mean})^2}{B}}$$

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