

Resolution test

Unfolding results for various resolutions

general plan

- ▶ test of unfolding software with blind samples
 - ▶ resulting histograms have 30 with **resolution = 0.4**
 - ▶ comparison of different unfolding algorithms
- ▶ objection about the number of bins:
 - ▶ regularization too strong to obtain reasonable results?

idea (Gero)

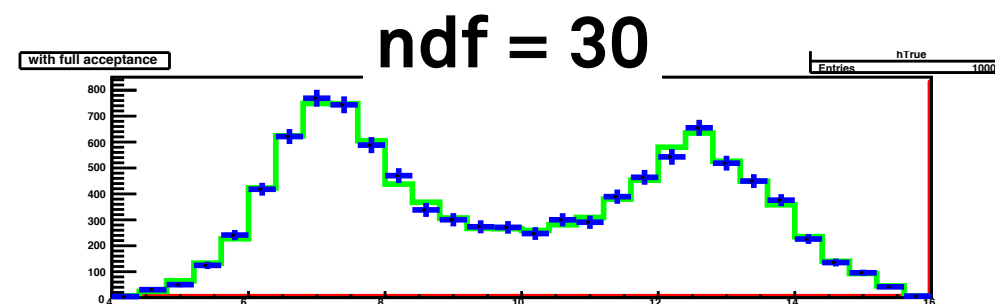
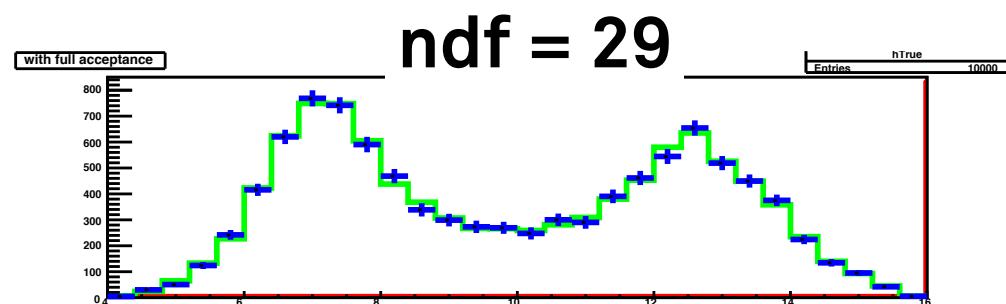
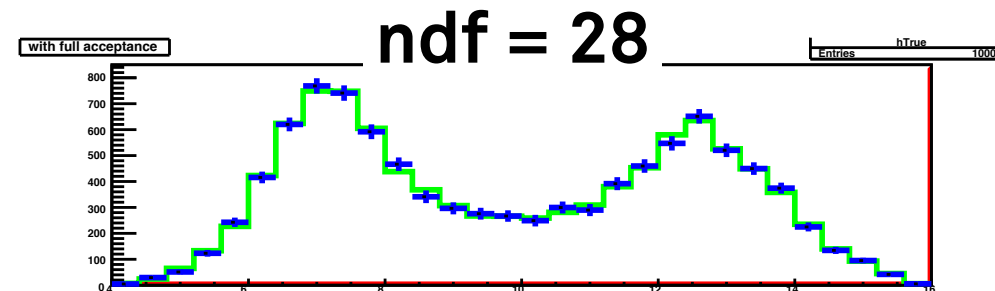
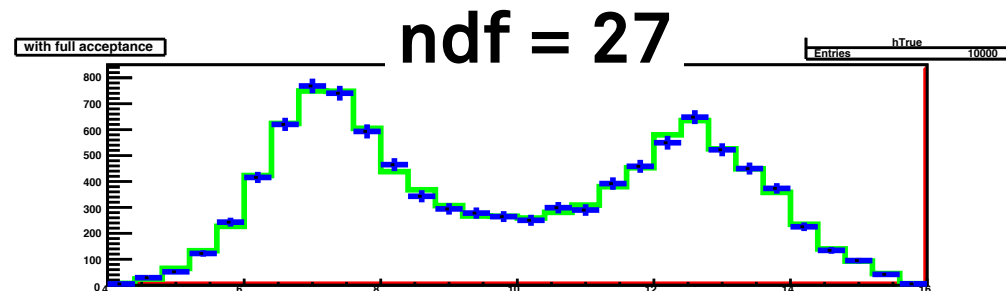
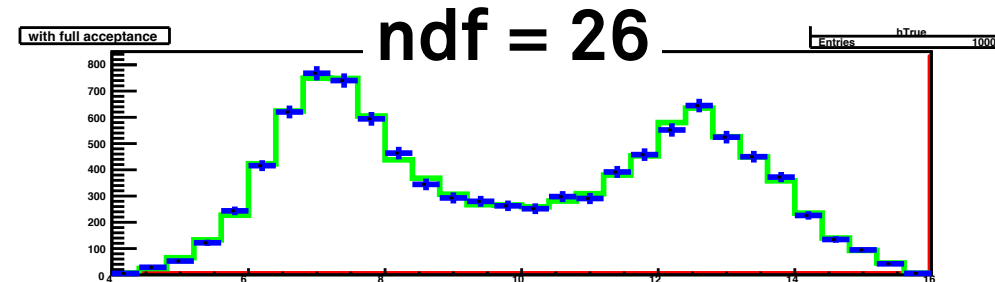
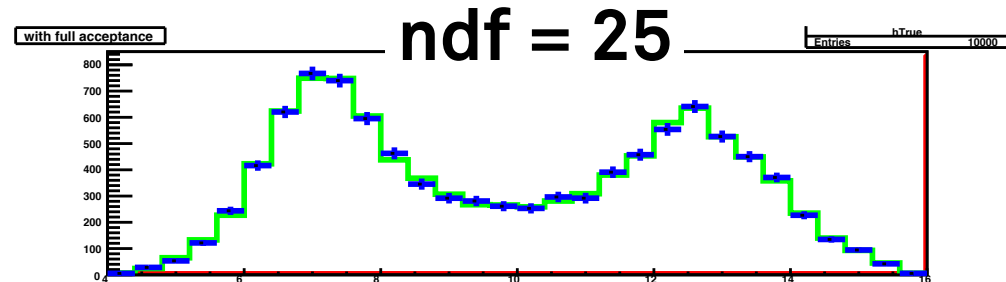
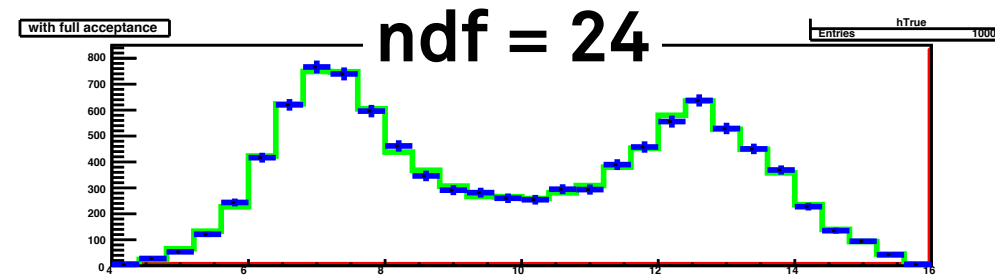
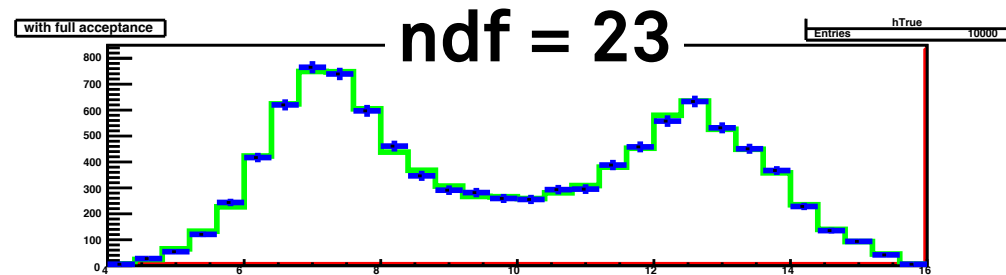
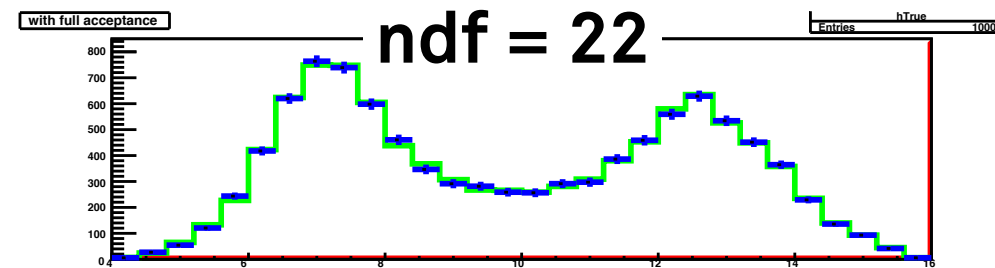
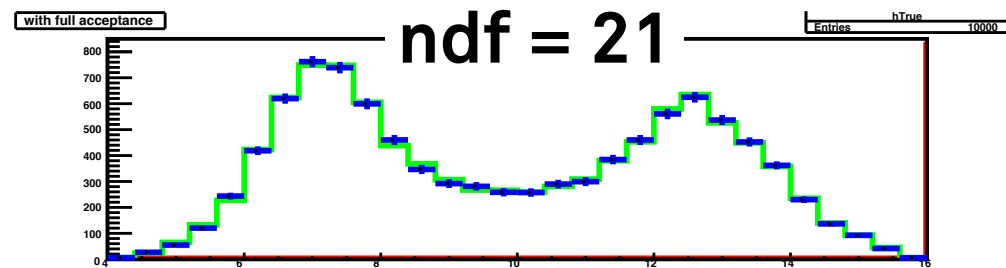
- ▶ keep the number of bins fixed = 30 (resolution = 0.4)
- ▶ unfold samples with different resolutions
 - ▶ start with good resolution of 0.2
 - ▶ decrease resolution: 0.3, 0.4, ..., 1.5
 - ▶ observe the behavior of
 - ▶ fluctuations
 - ▶ bias
 - ▶ correlation

resolution = 0.2

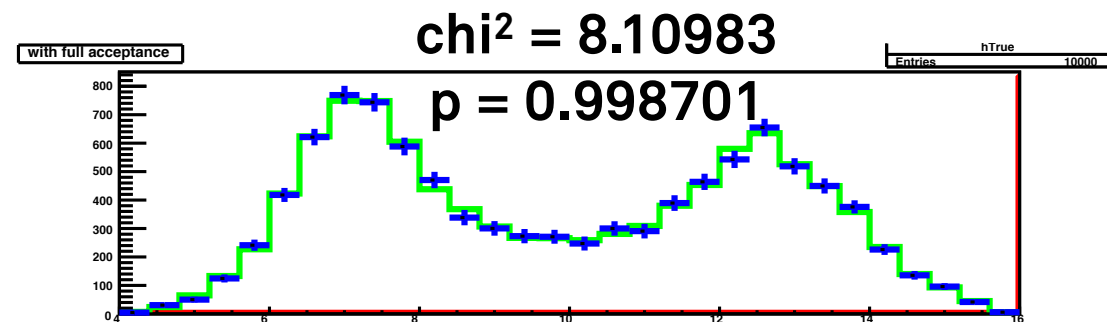
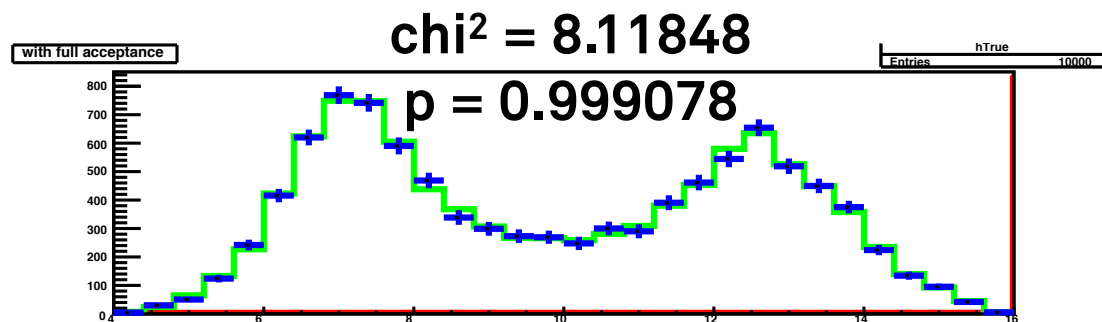
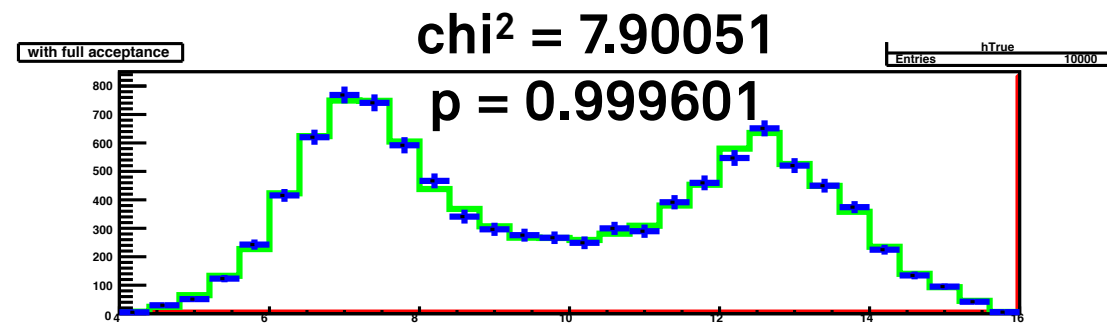
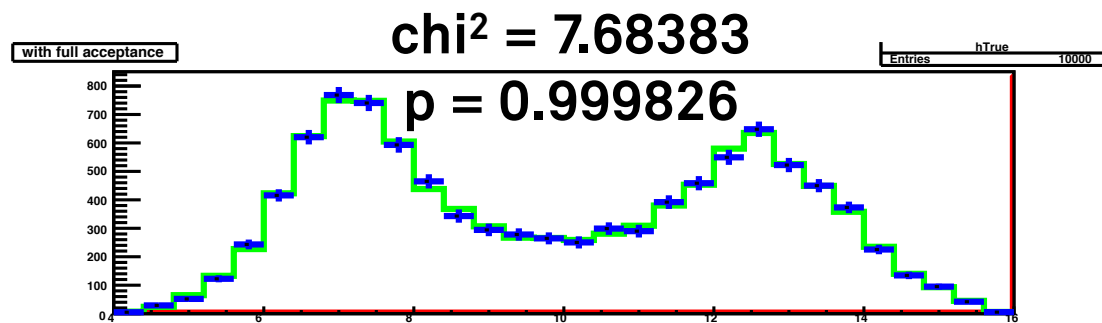
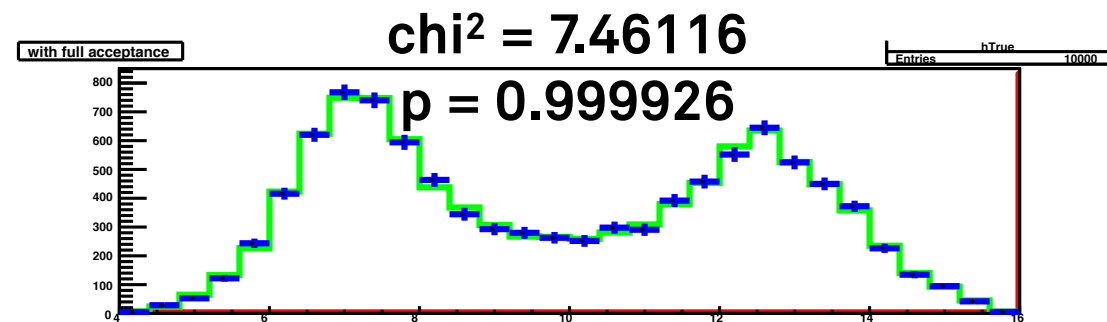
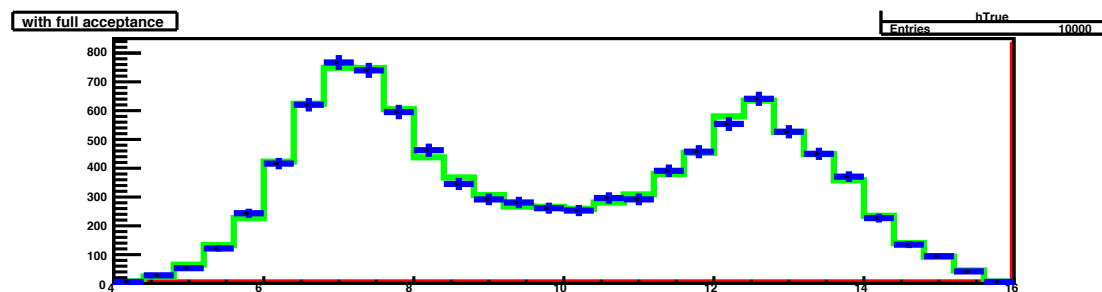
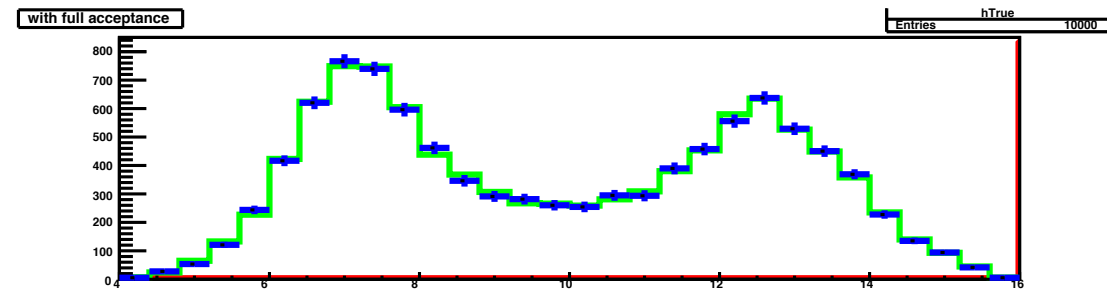
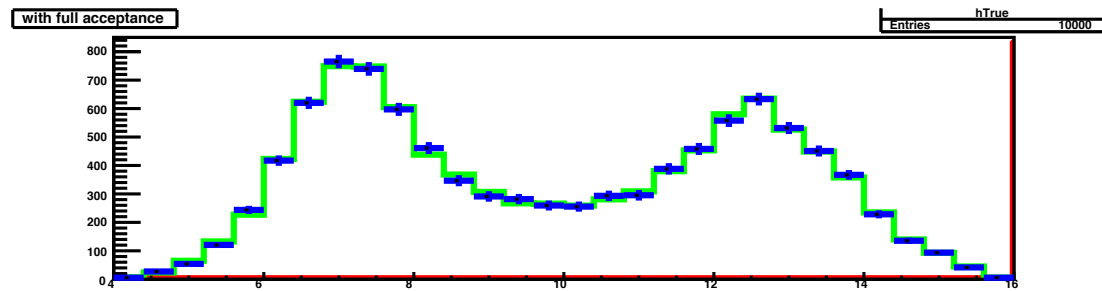
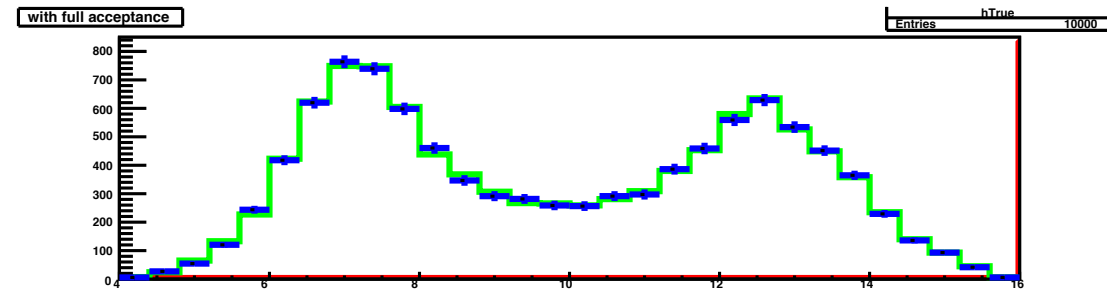
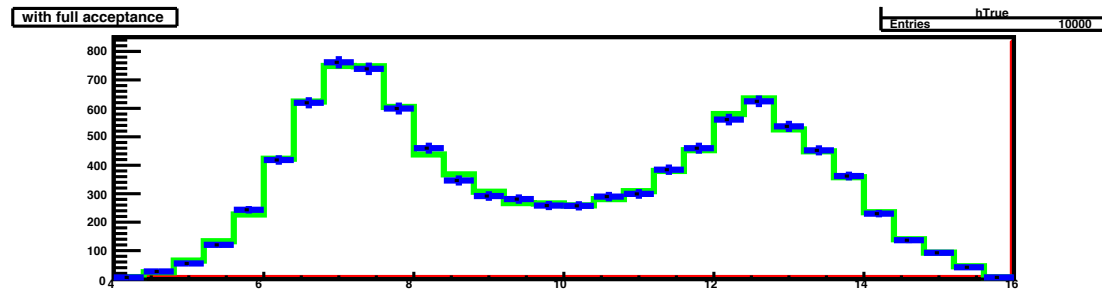
nknots = 60

nbins x_m = 60

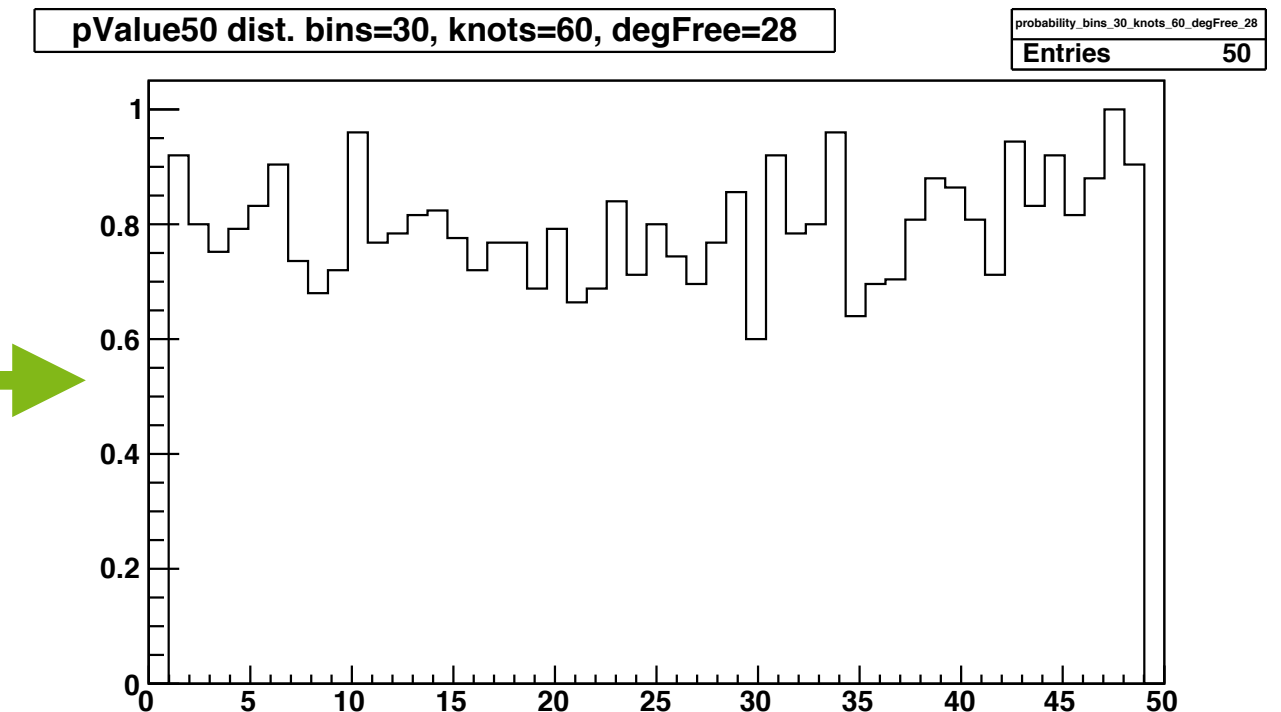
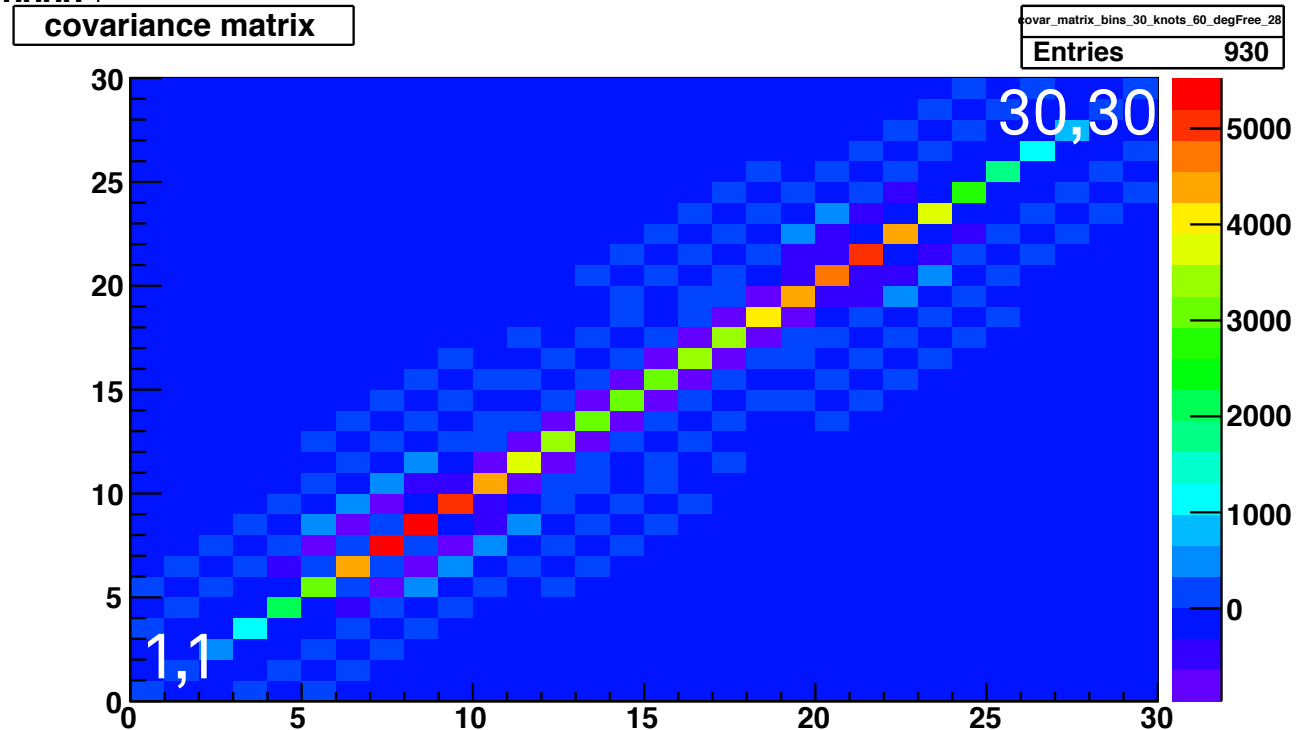
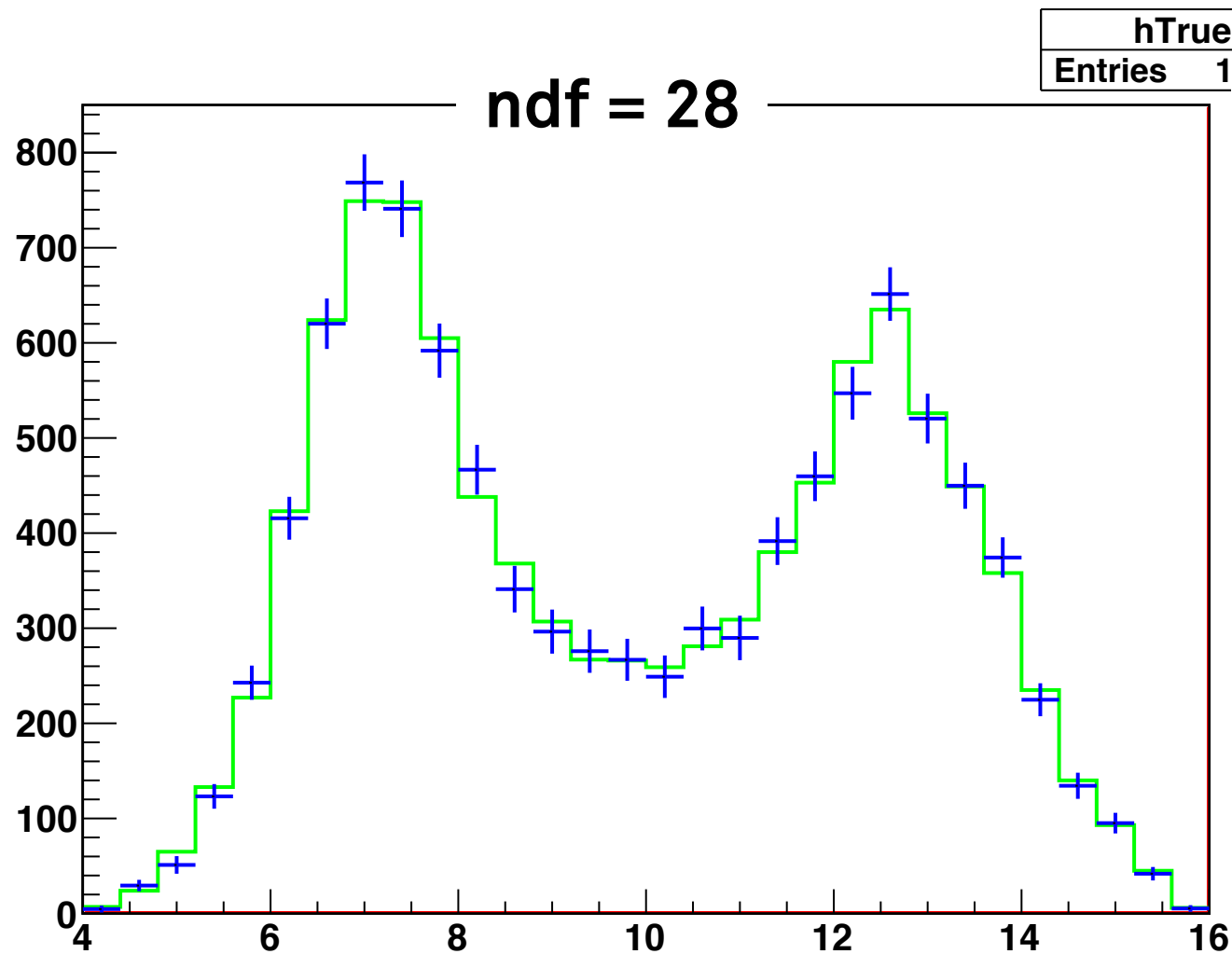
ndf = 21 - 30



resolution = 0.2



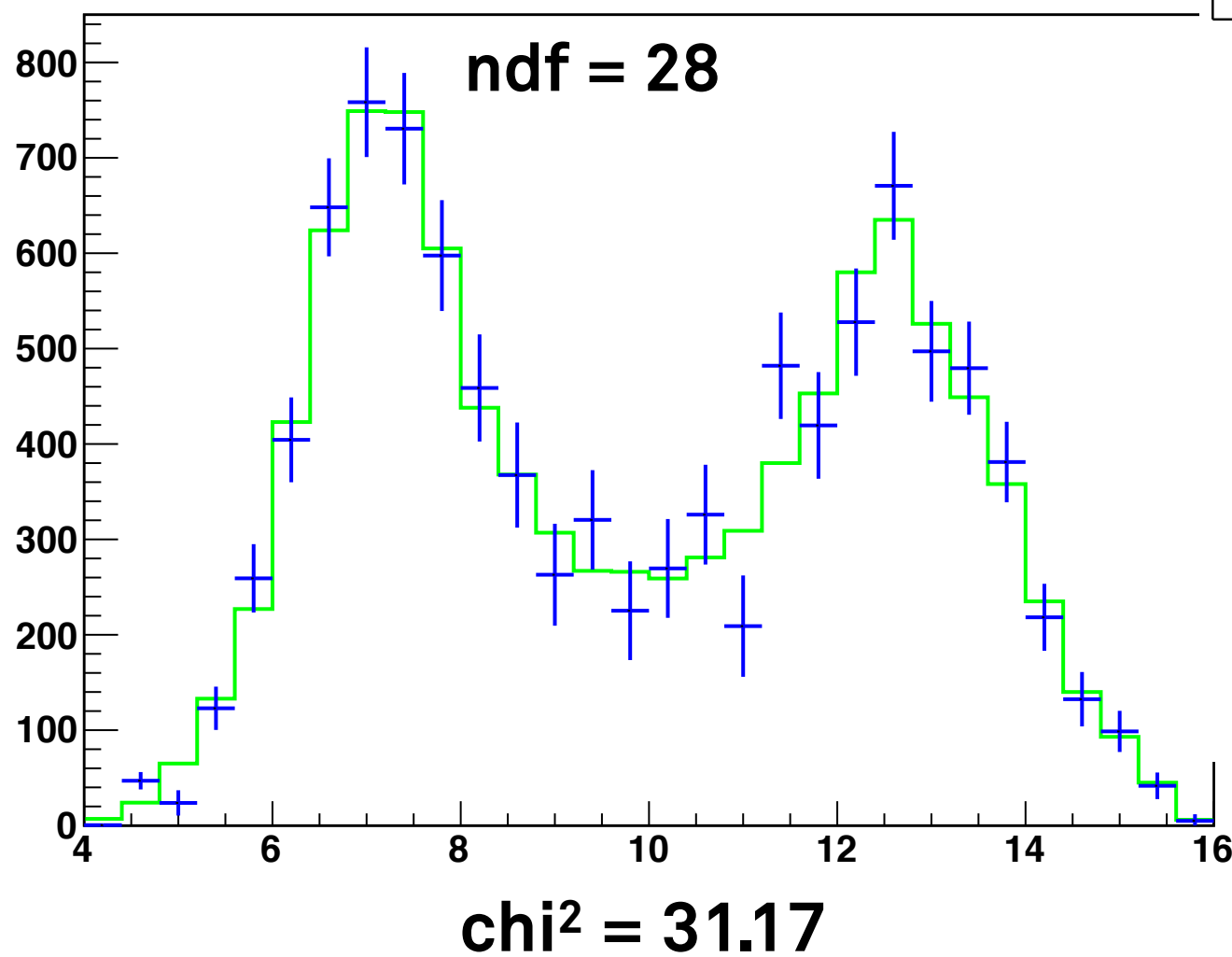
resolution = 0.2



correlation check
(flat = less correlation)
normalized



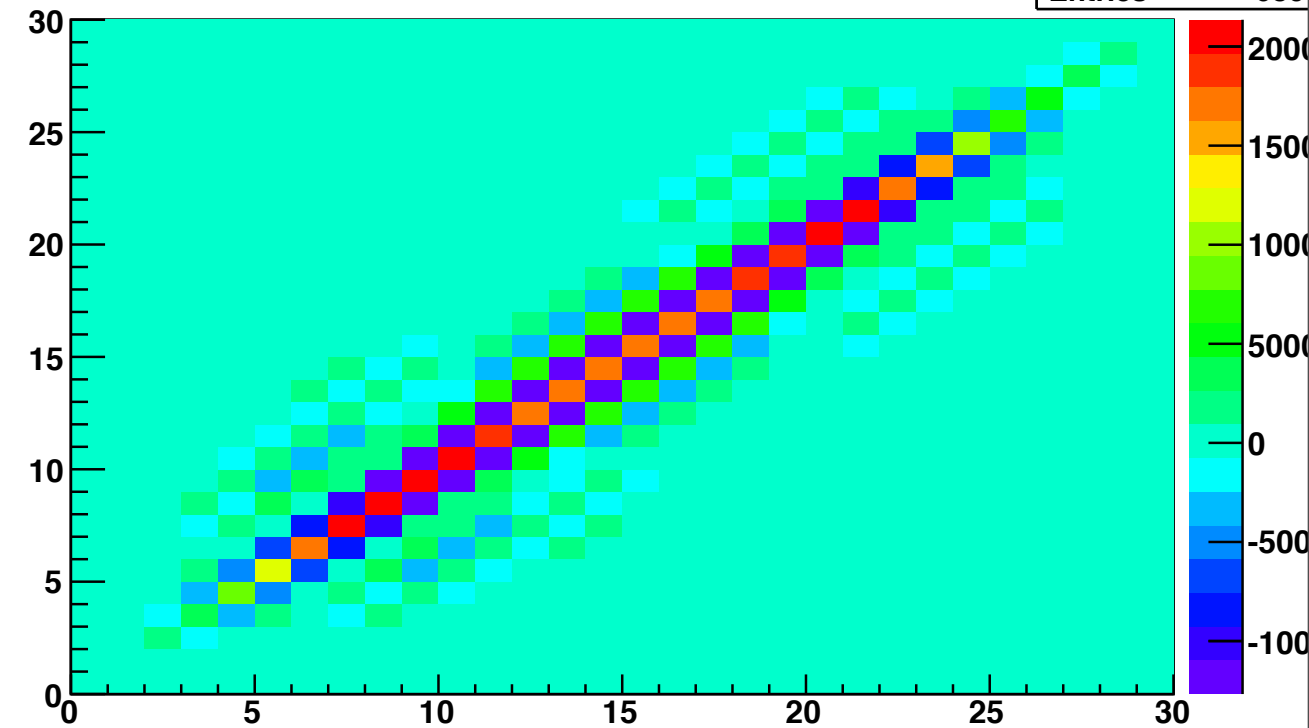
resolution = 0.3



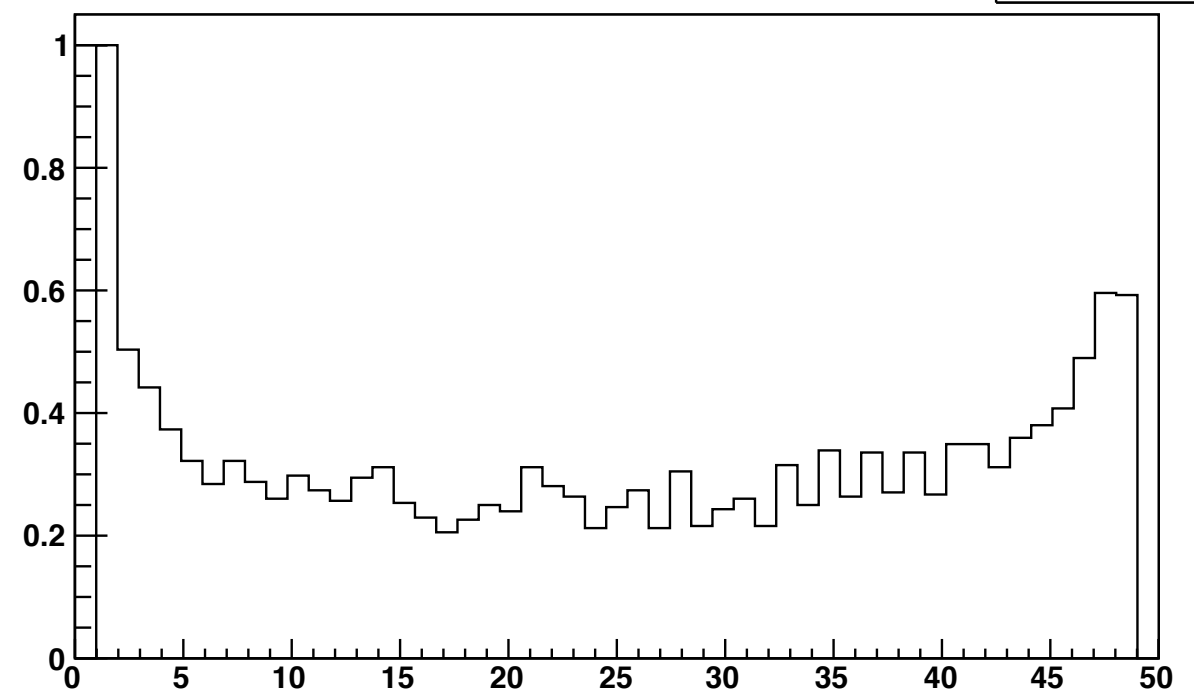
correlation check
(flat = less correlation)

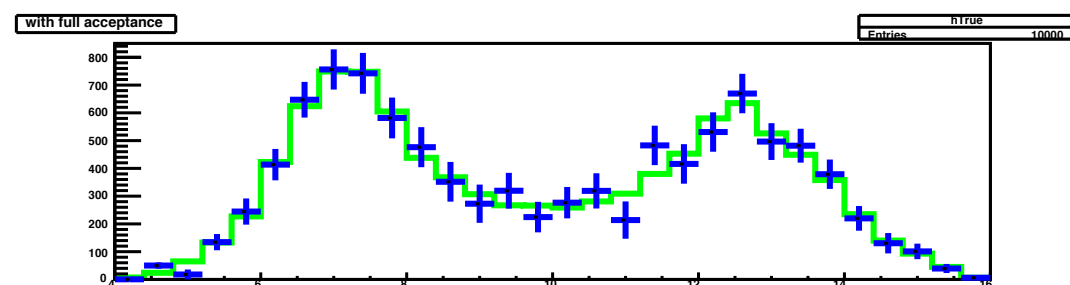
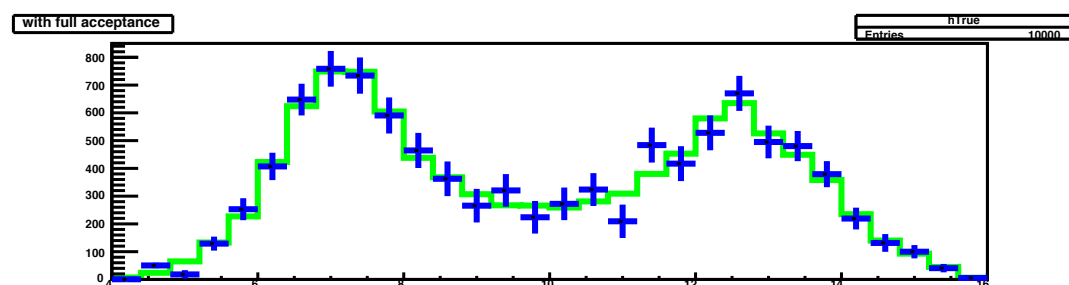
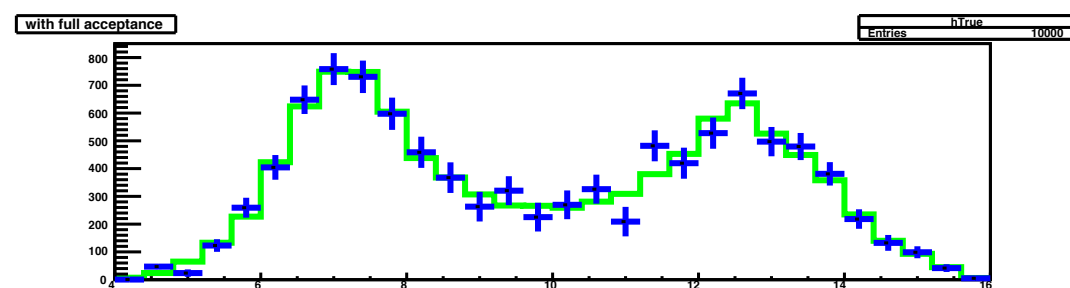
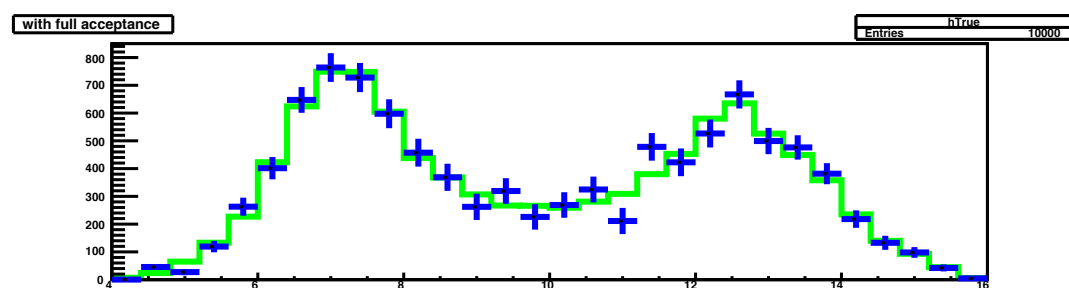
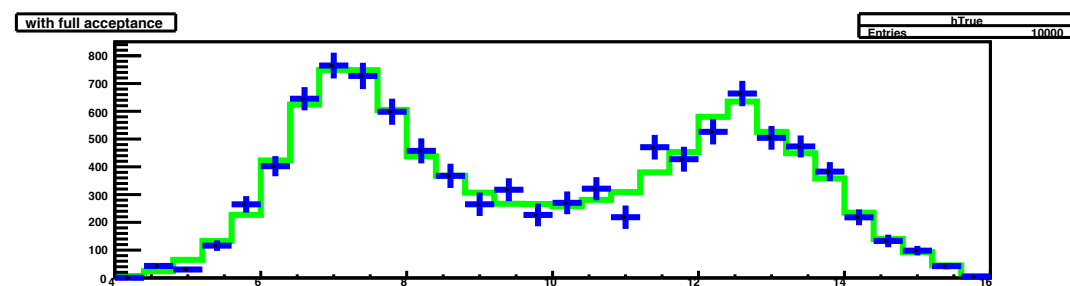
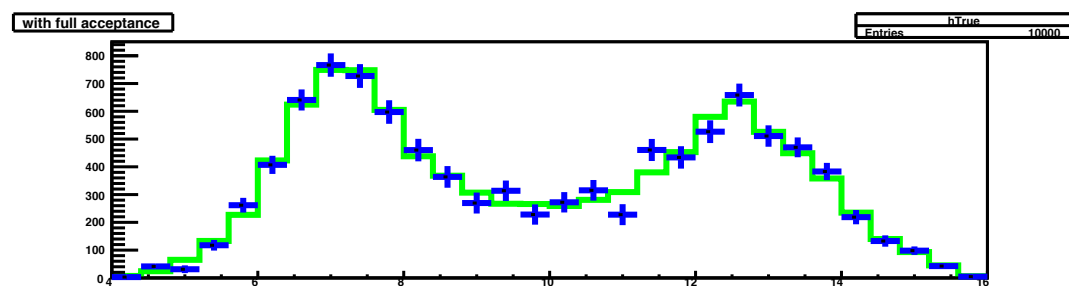
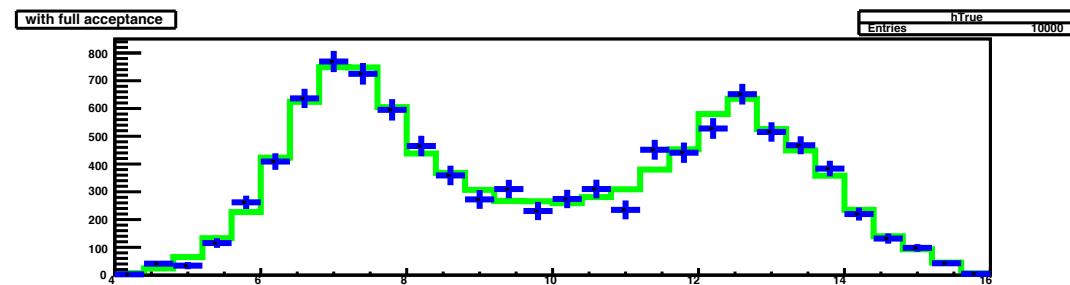
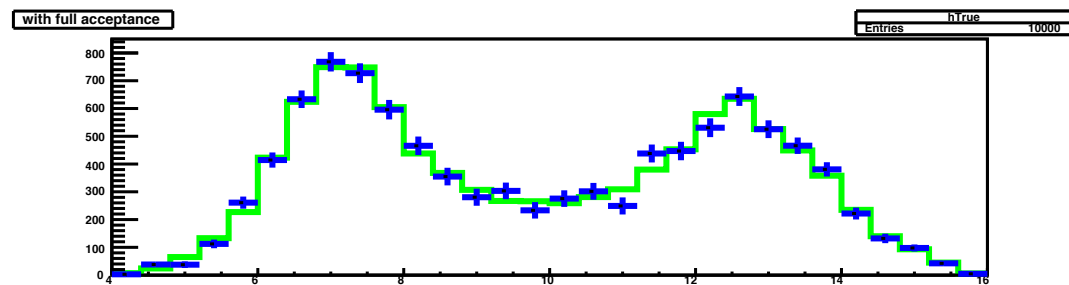
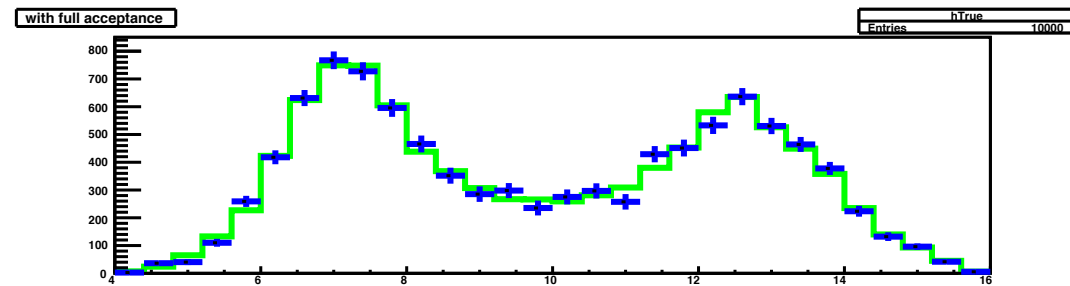
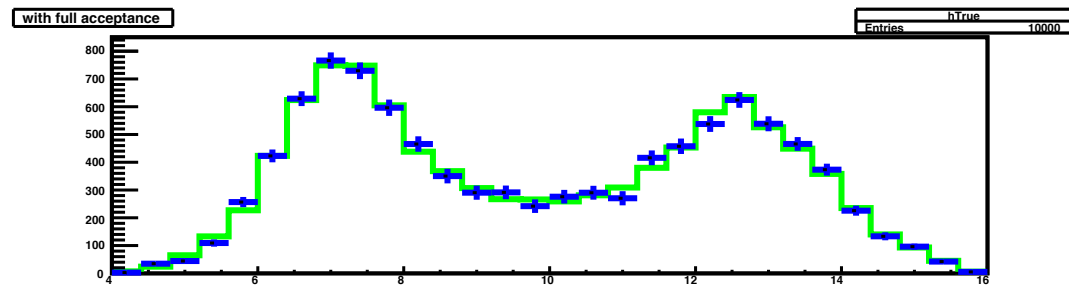


covariance matrix

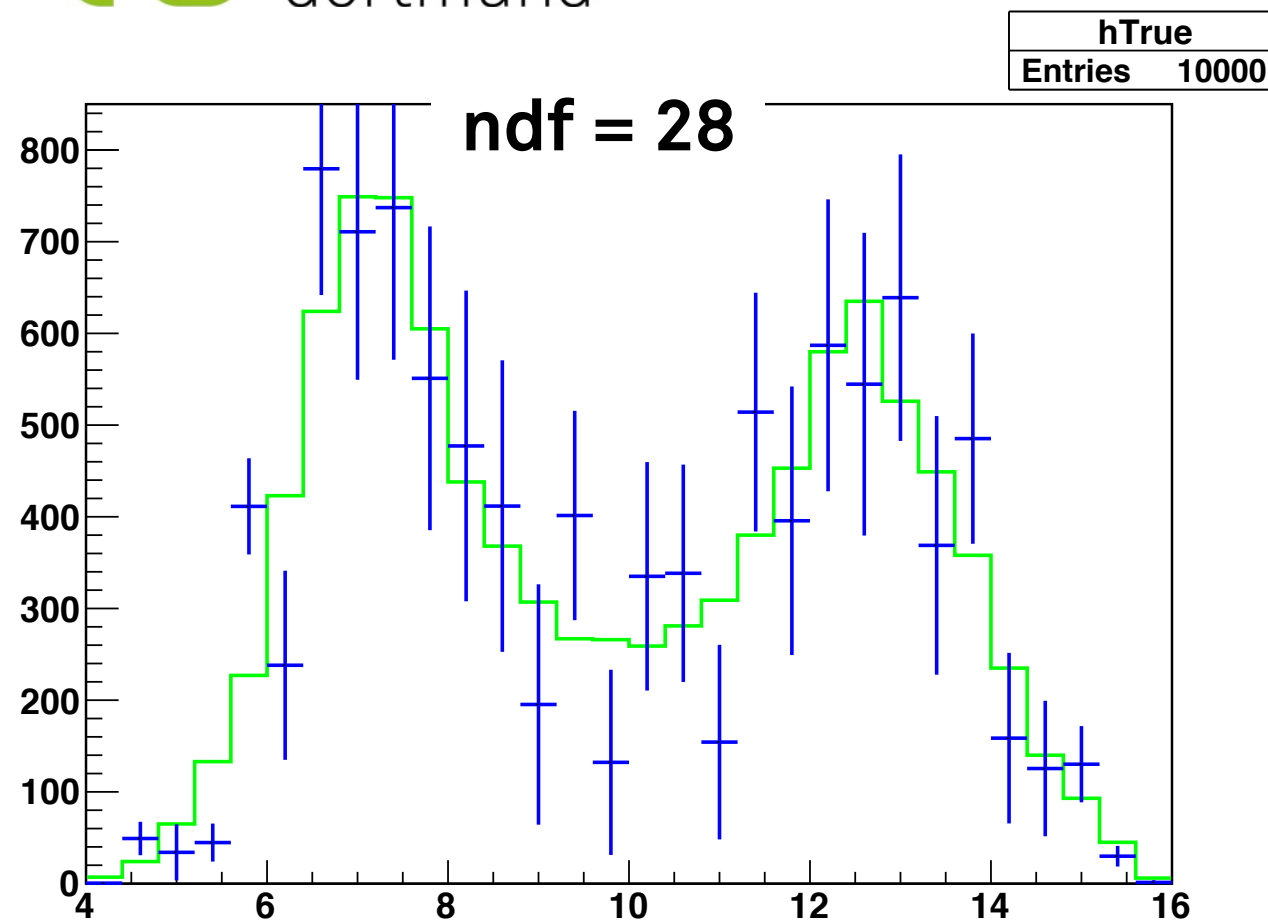


pValue50 dist. bins=30, knots=60, degFree=28

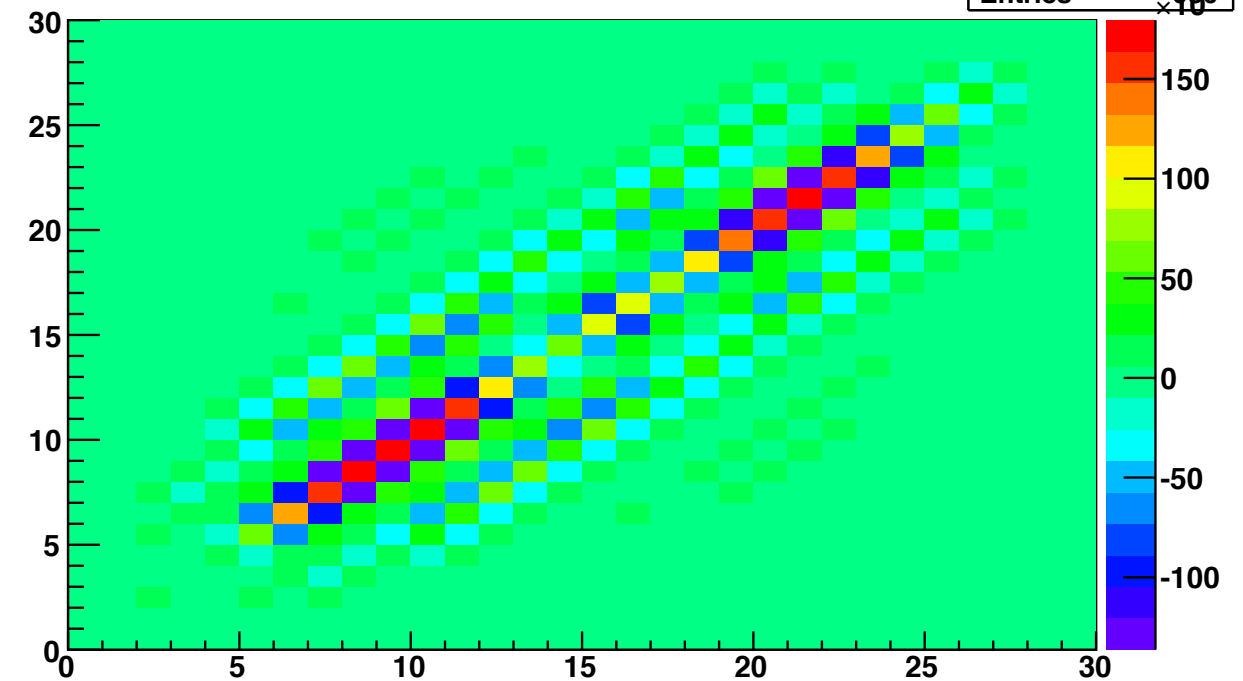




resolution = 0.4



covariance matrix

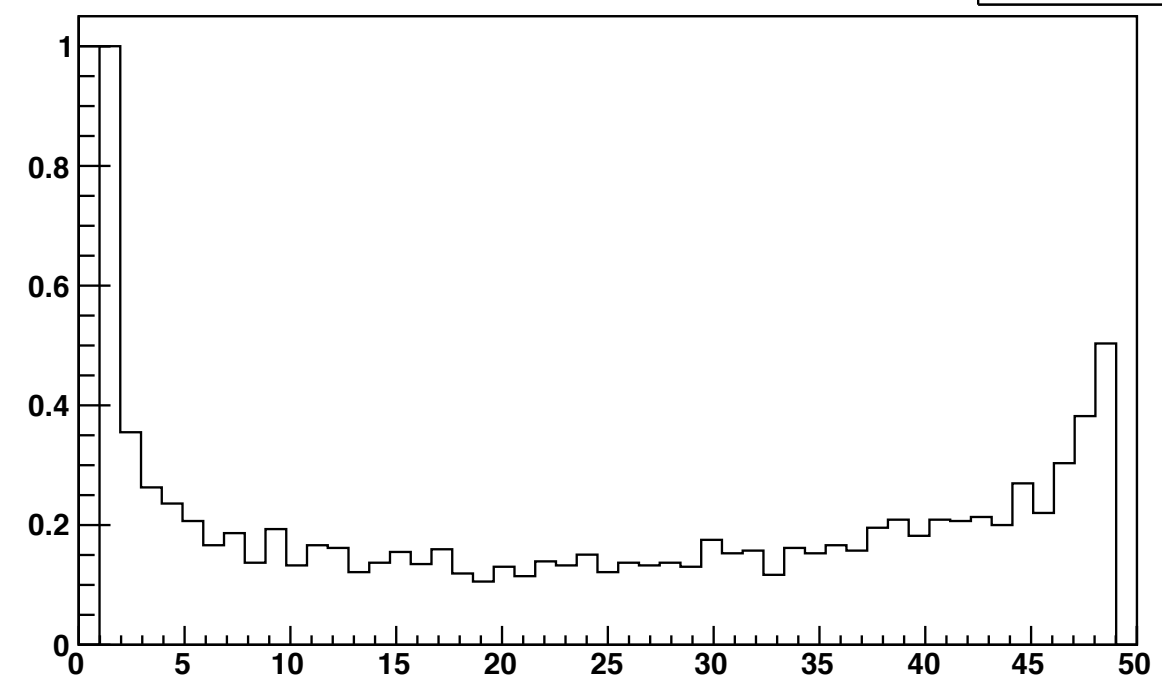


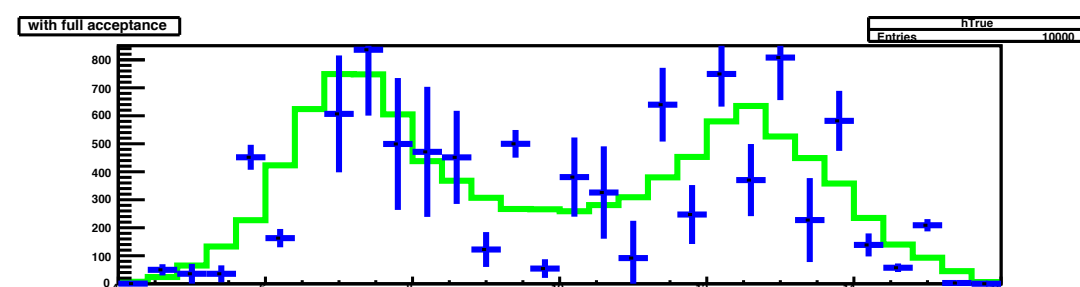
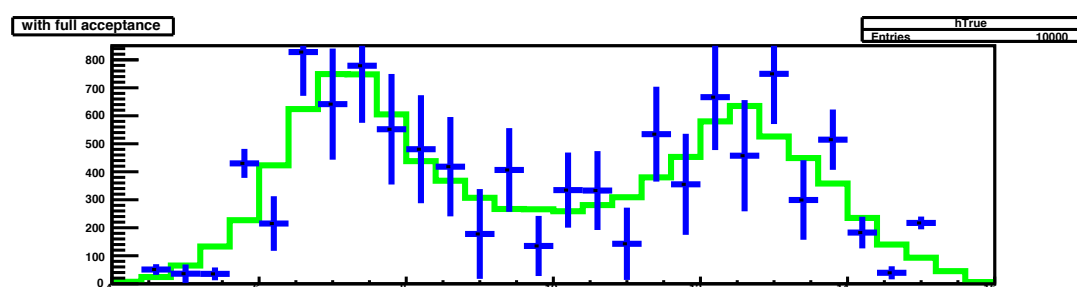
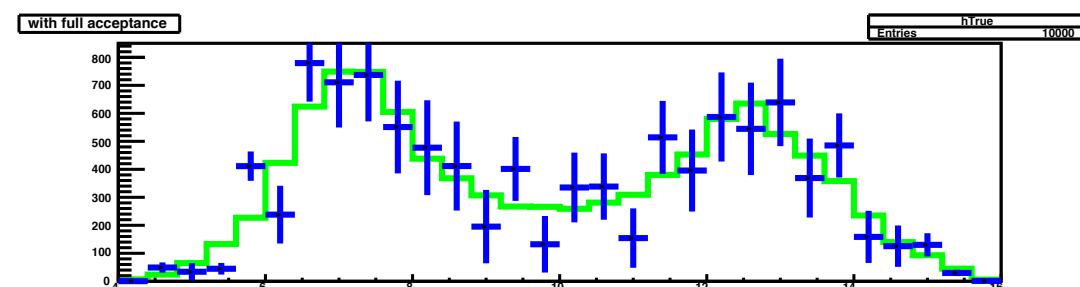
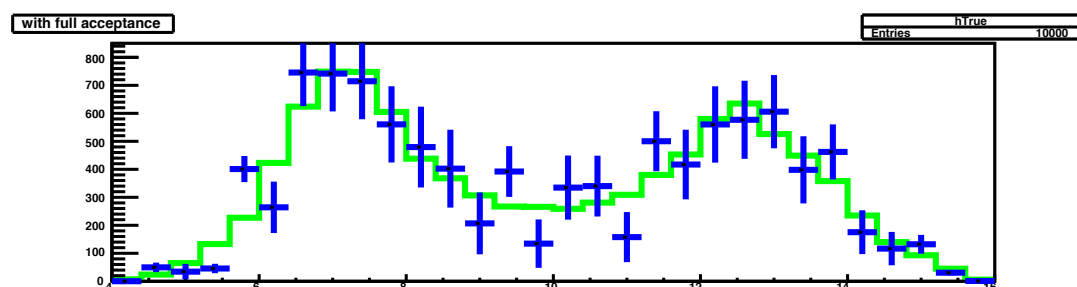
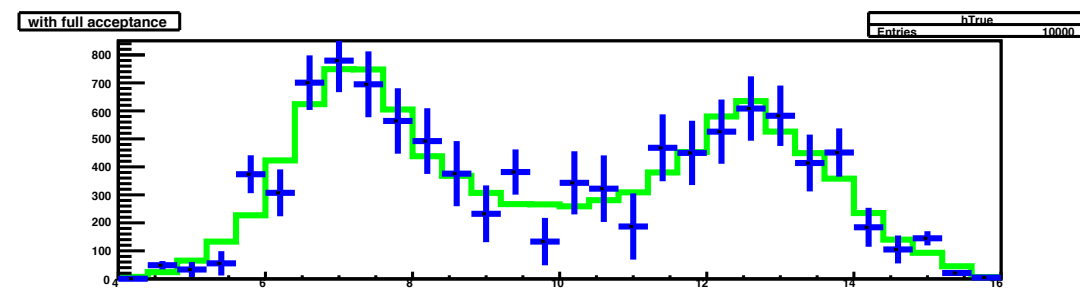
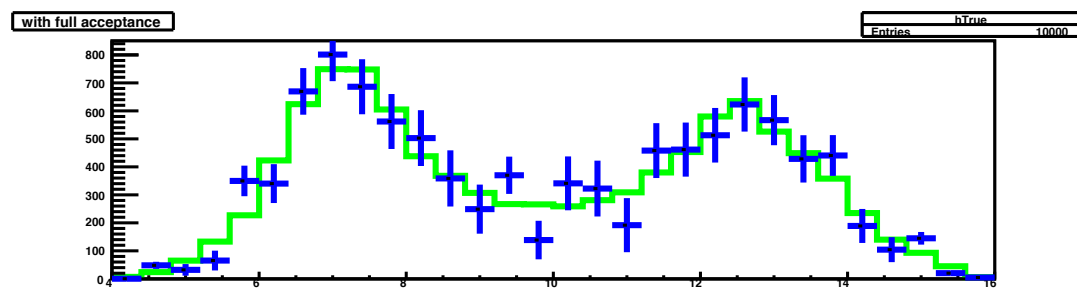
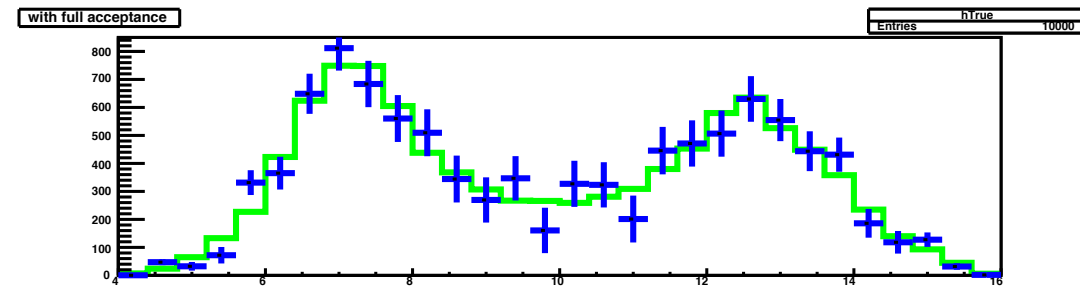
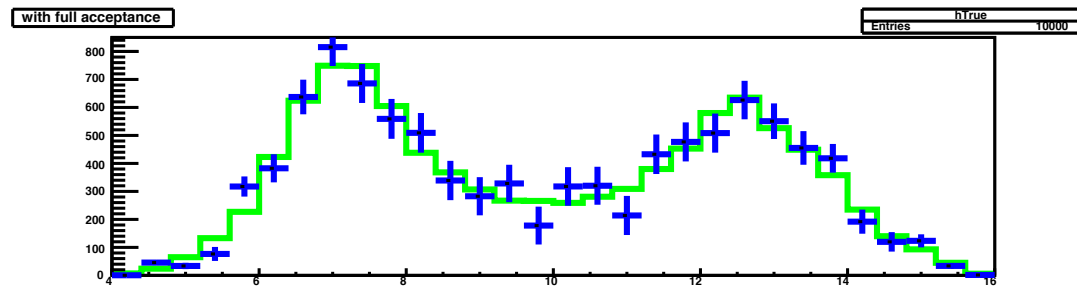
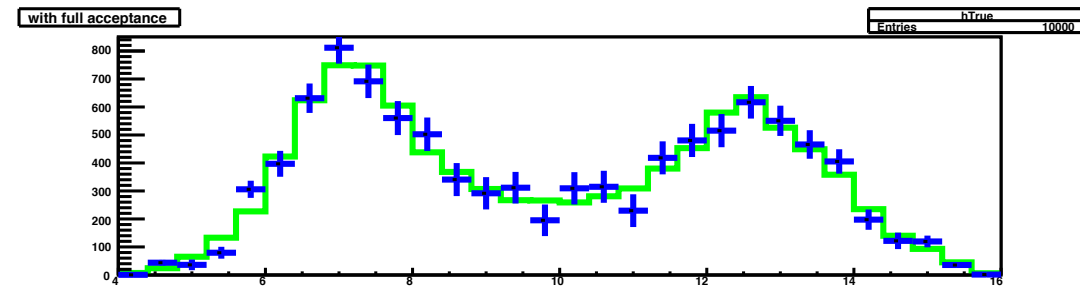
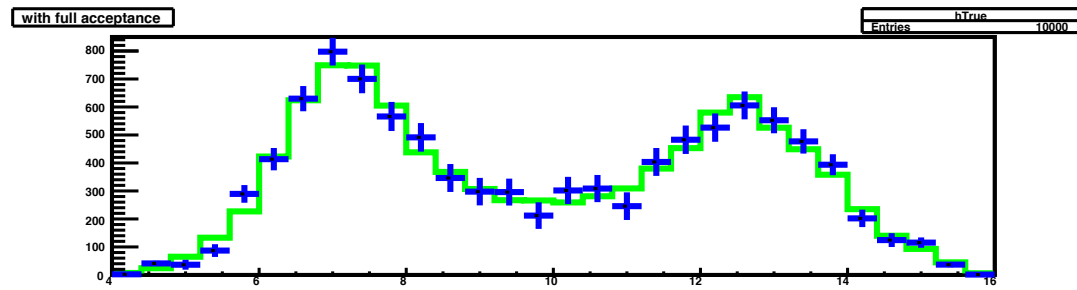
$\chi^2 = 53.2899$

correlation check
(flat = less correlation)

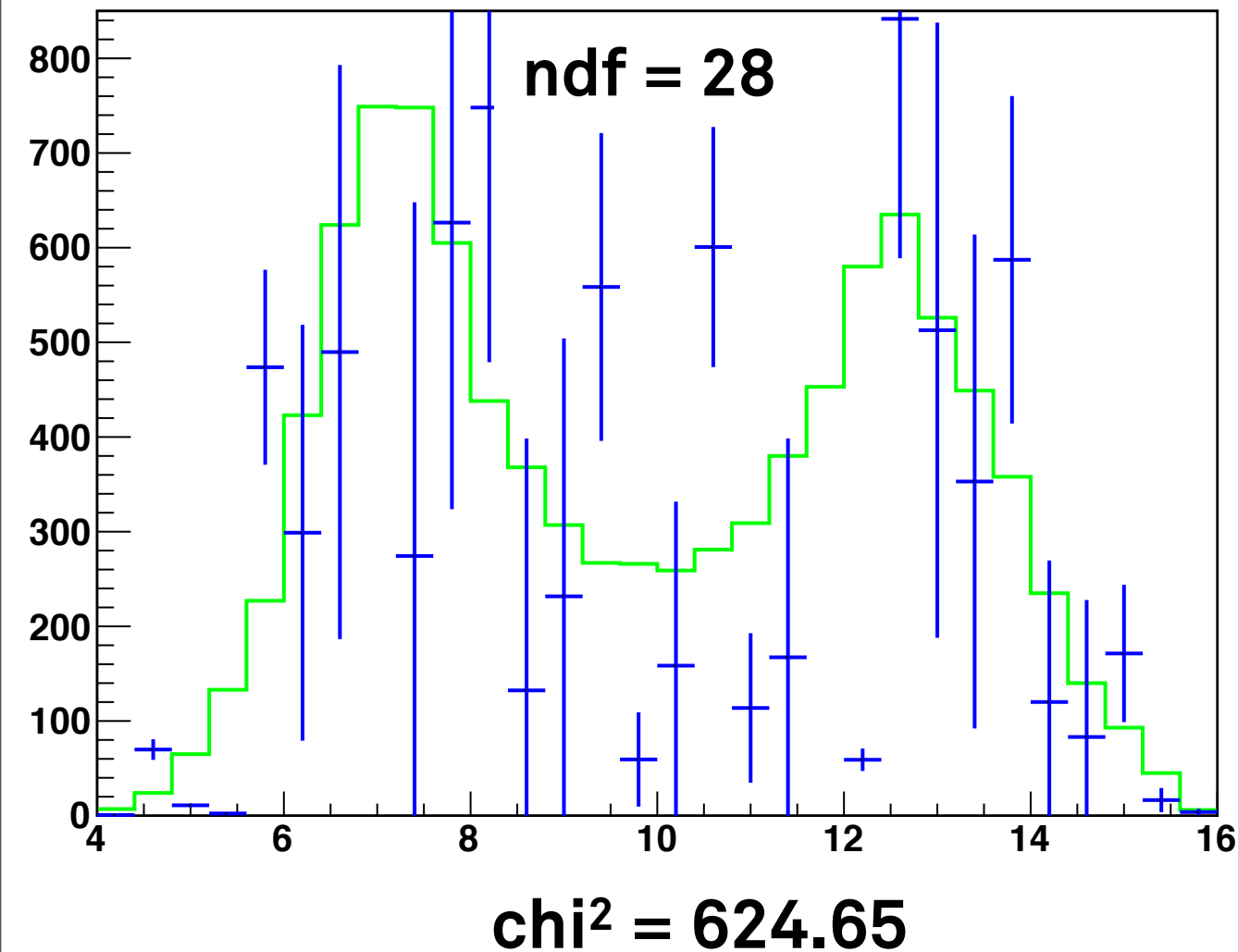


pValue50 dist. bins=30, knots=60, degFree=28

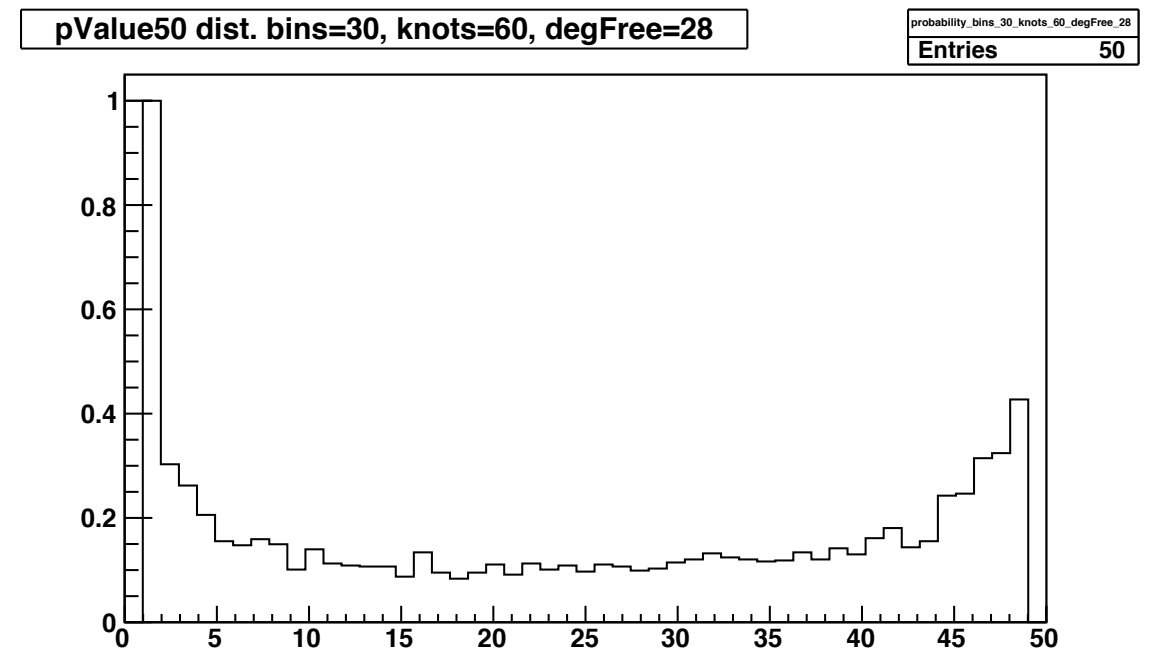
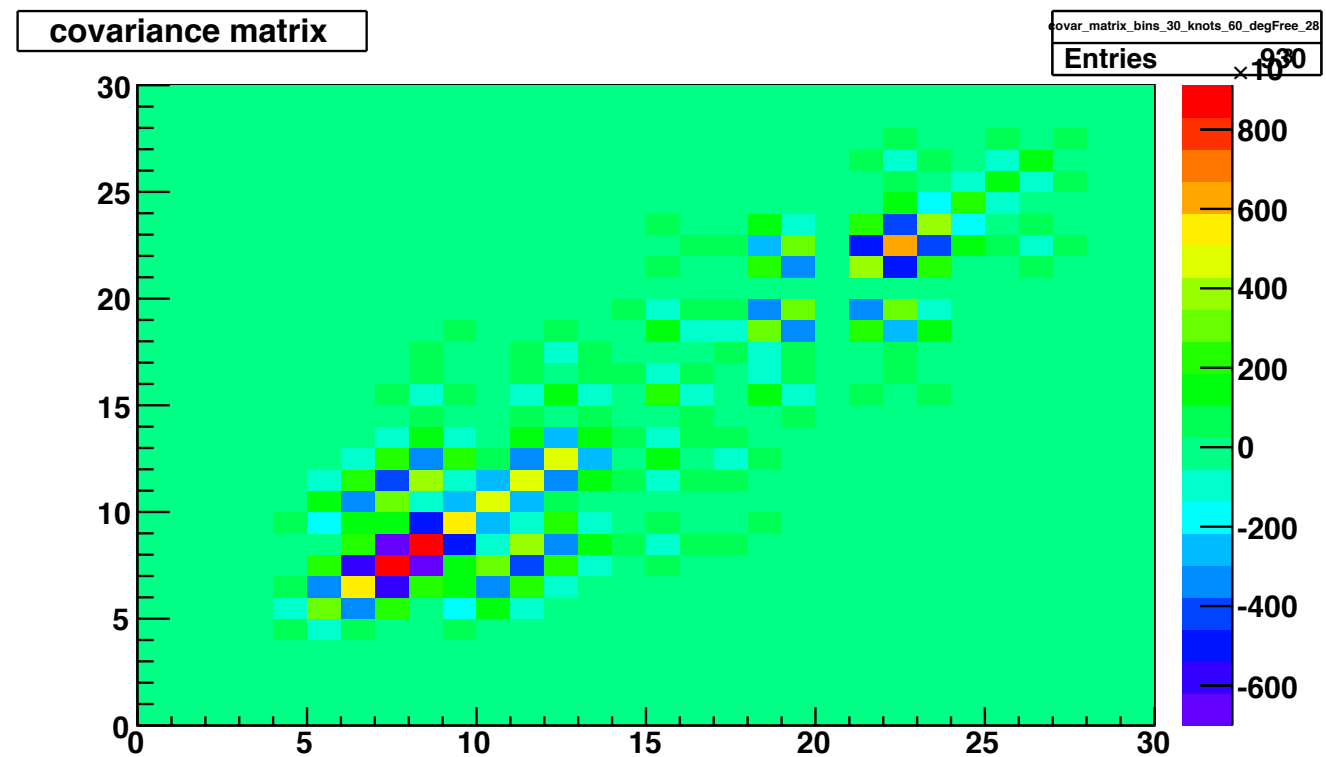




resolution = 0.5

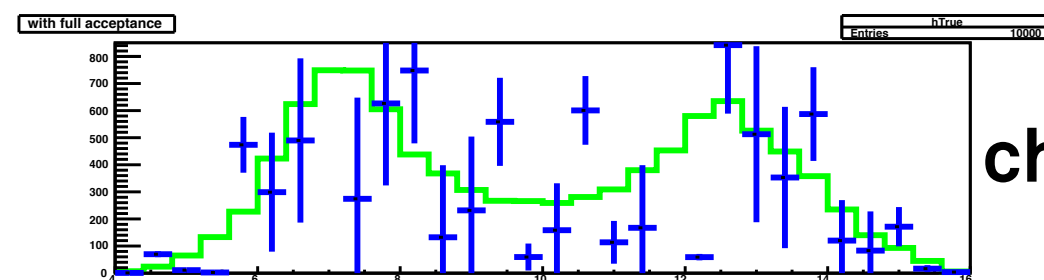
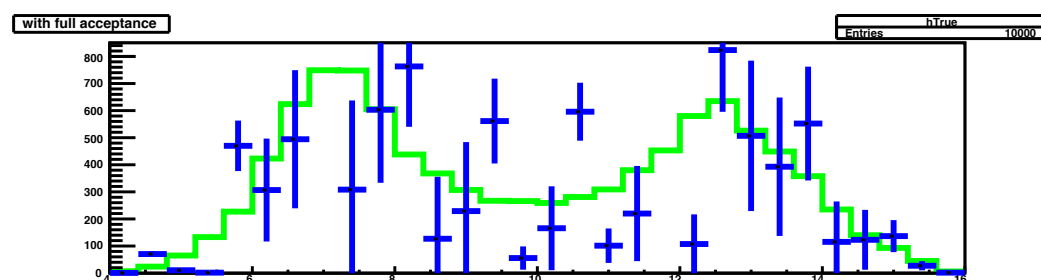
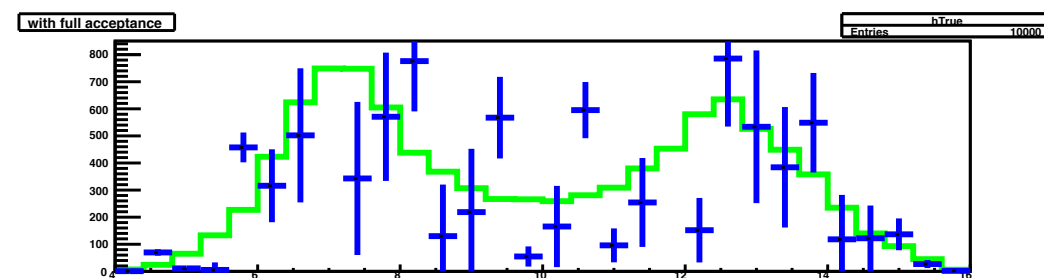
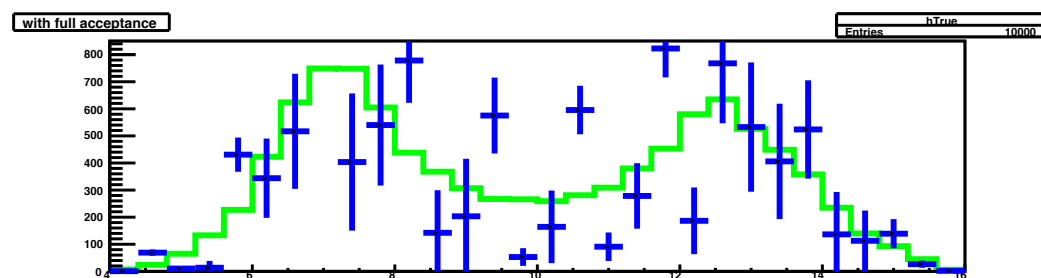
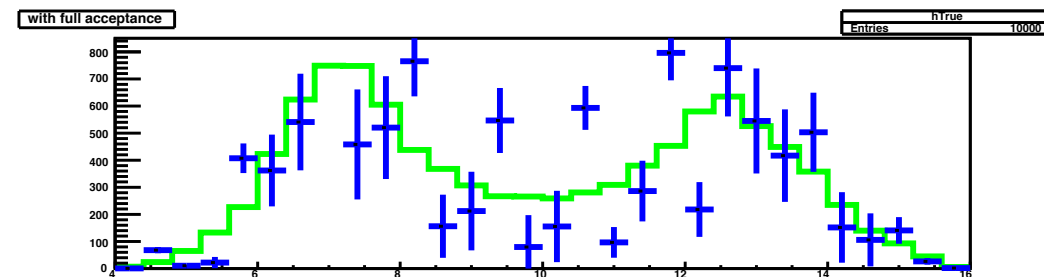
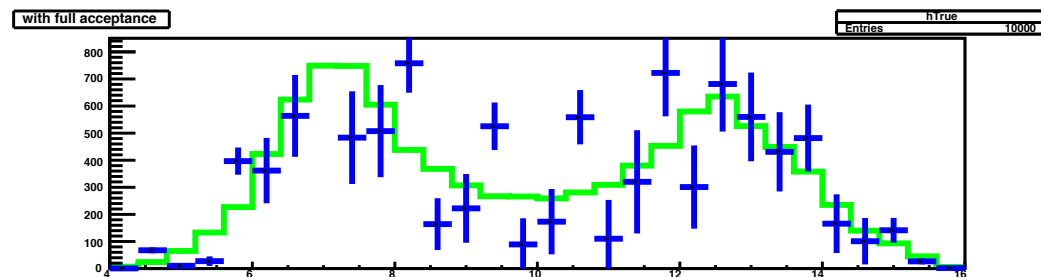
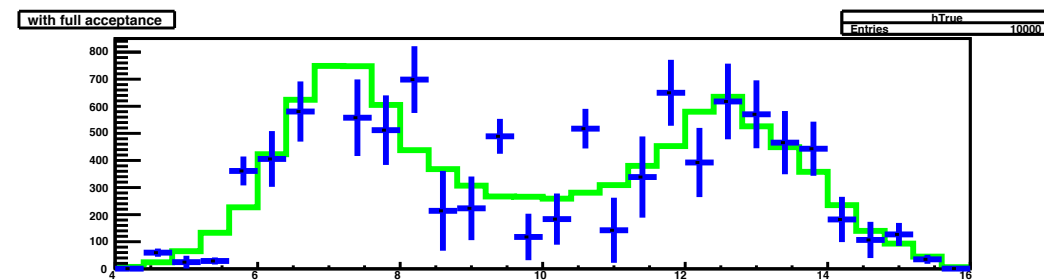
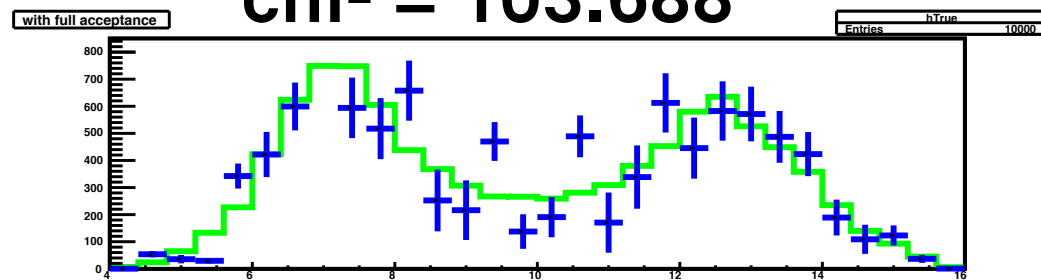


correlation check
(flat = less correlation) →

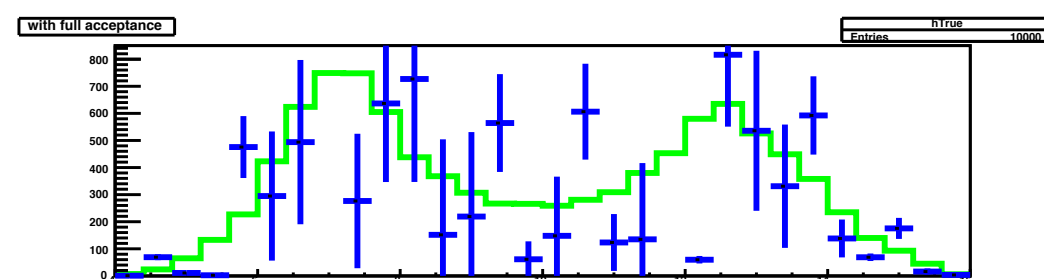
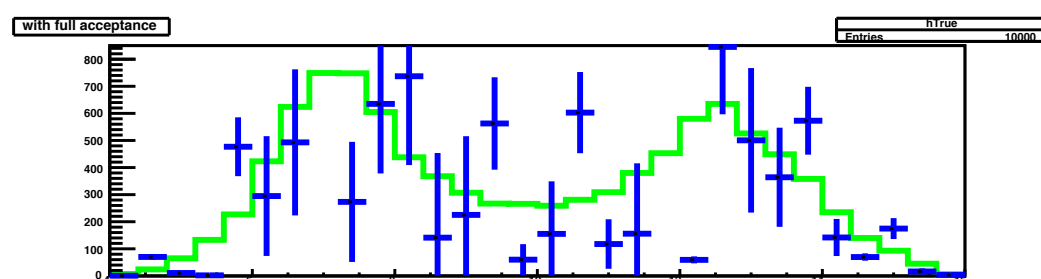


$\chi^2 = 103.688$

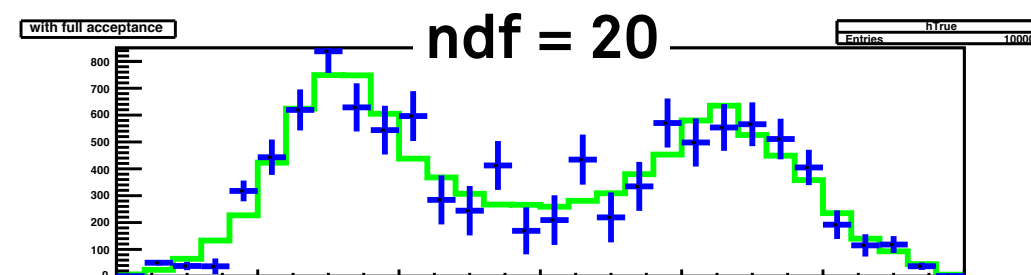
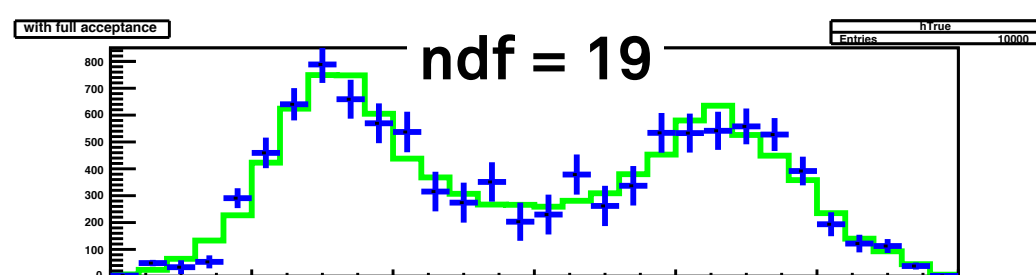
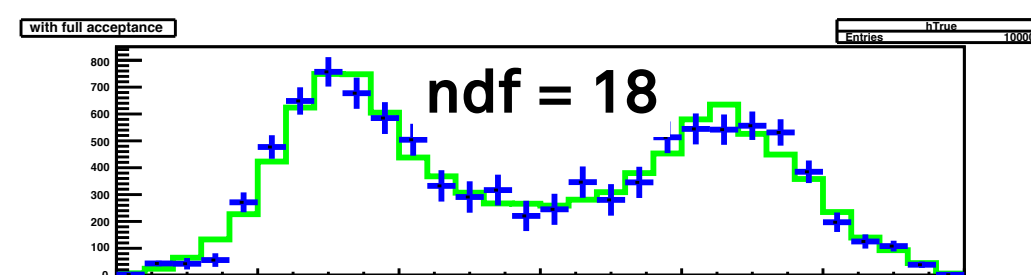
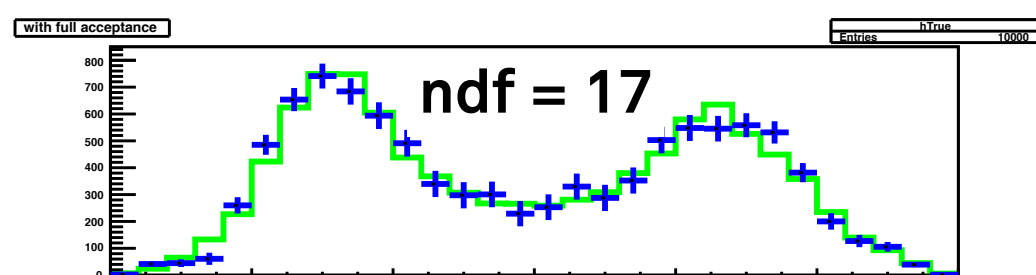
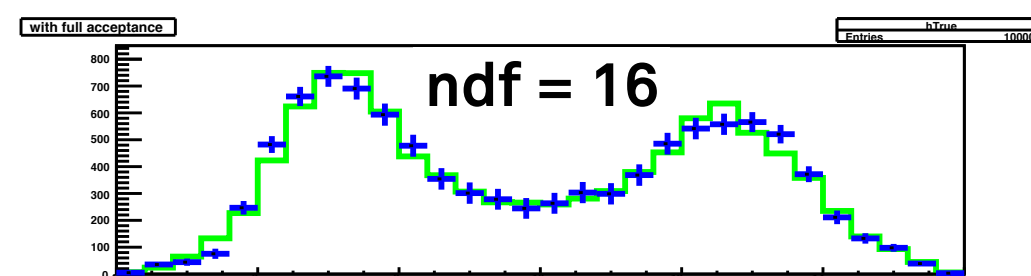
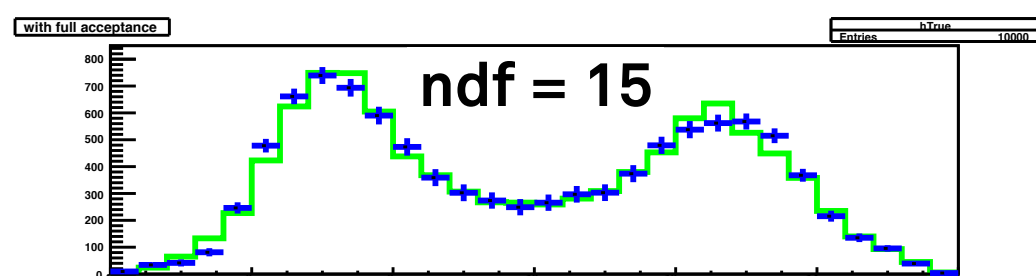
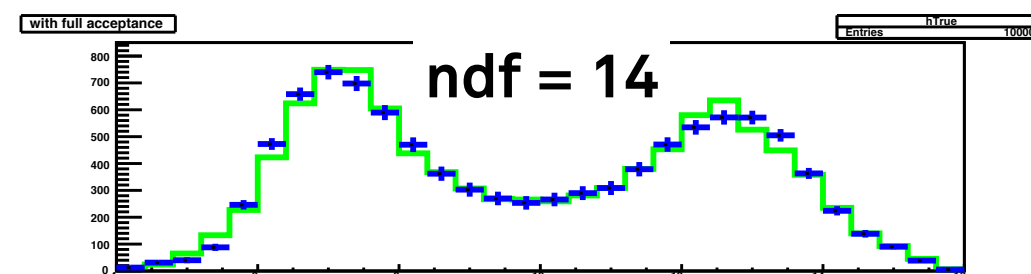
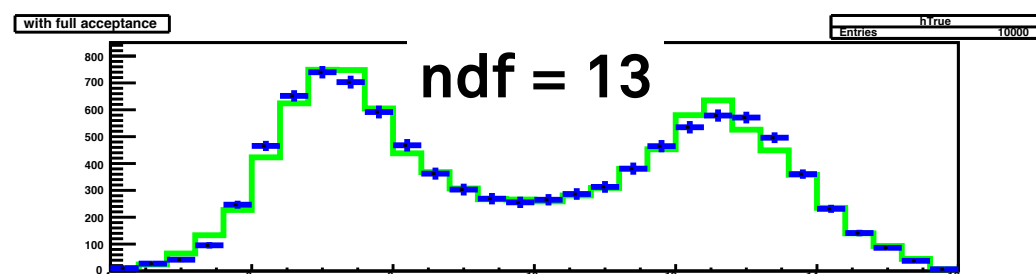
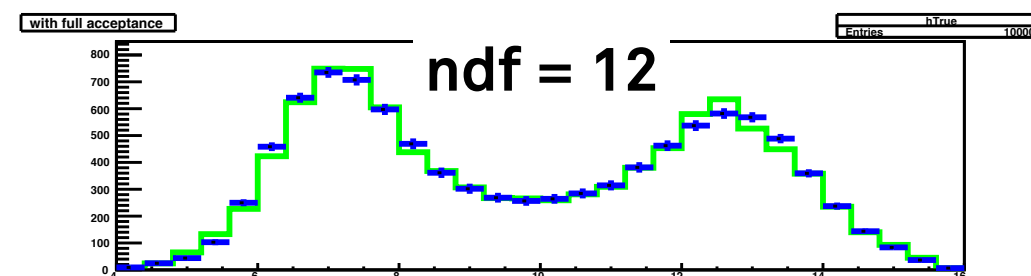
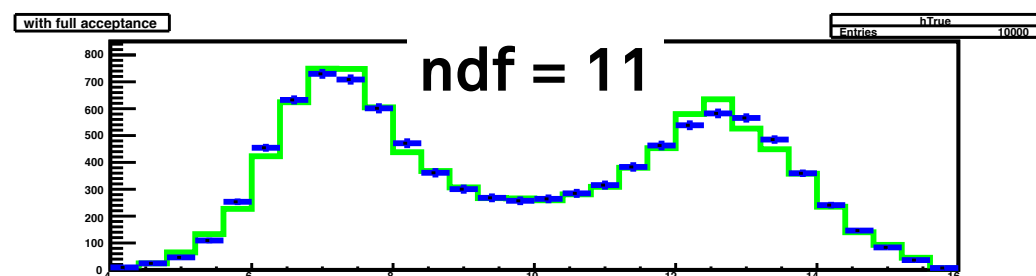
resolution = 0.5



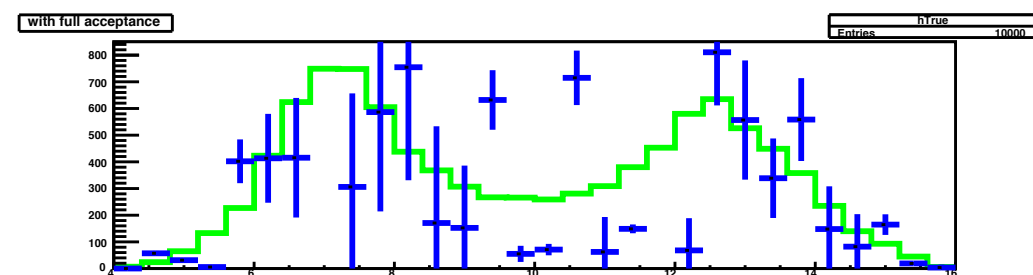
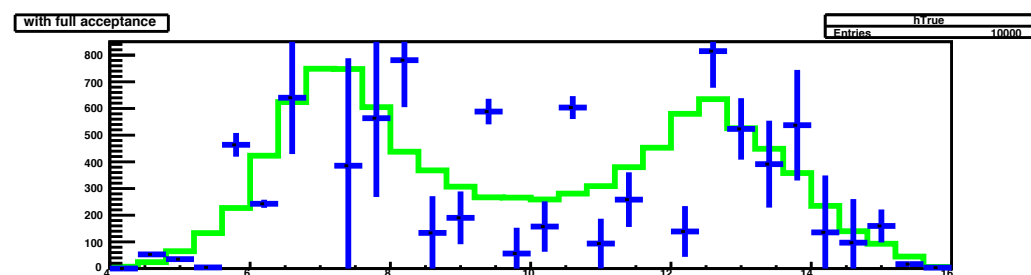
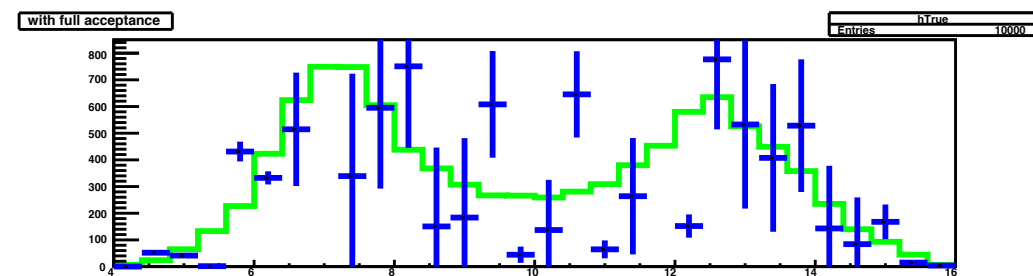
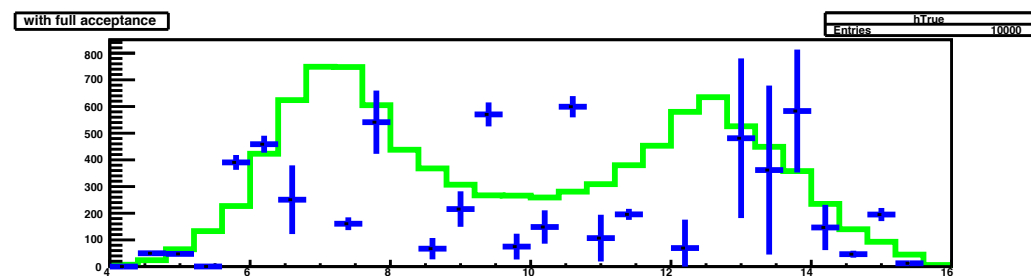
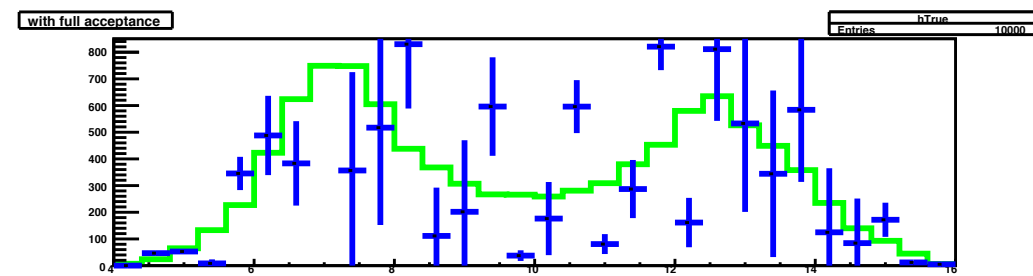
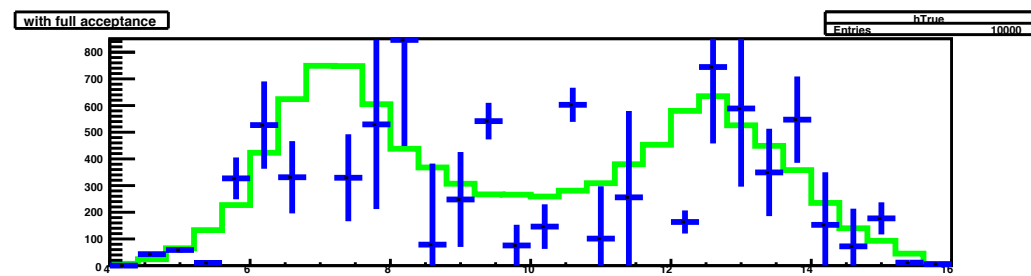
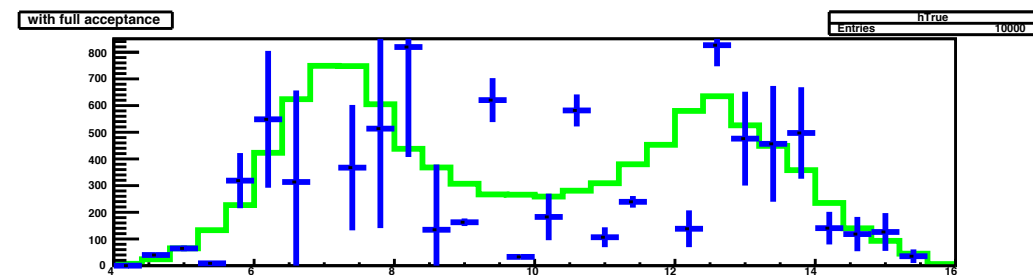
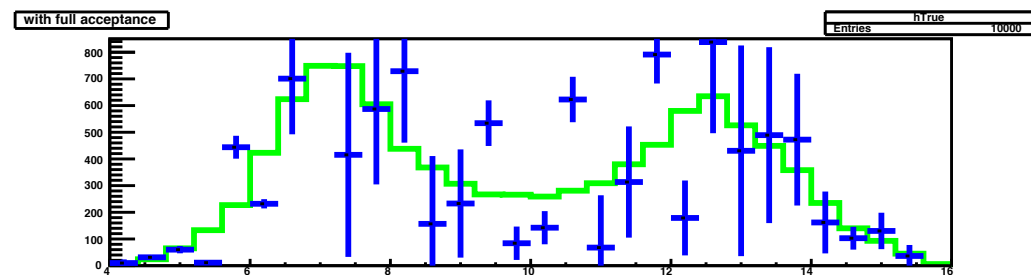
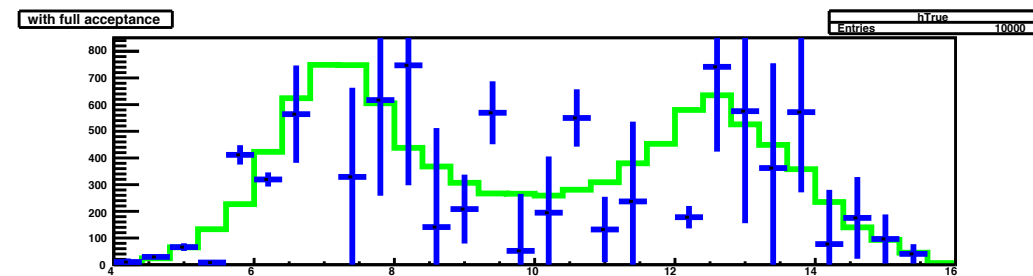
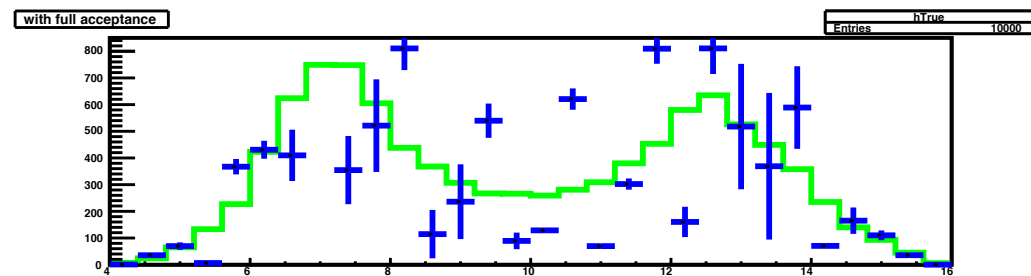
$\chi^2 = 624.65$



resolution = 0.5



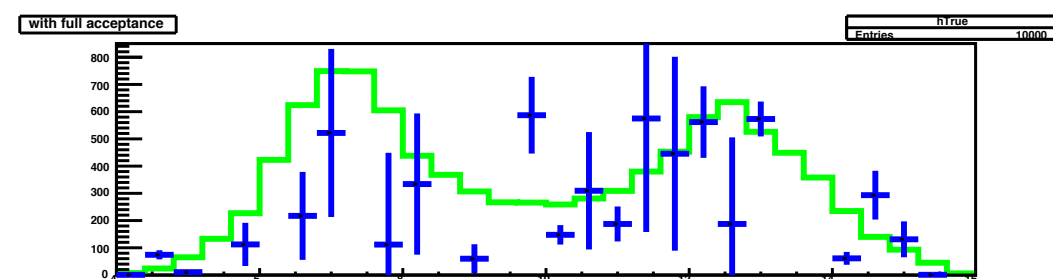
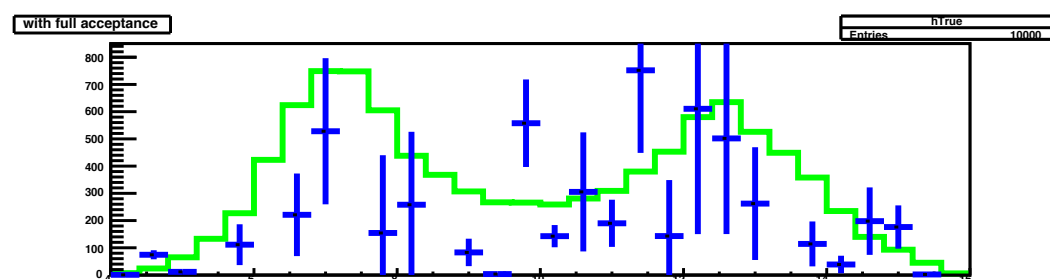
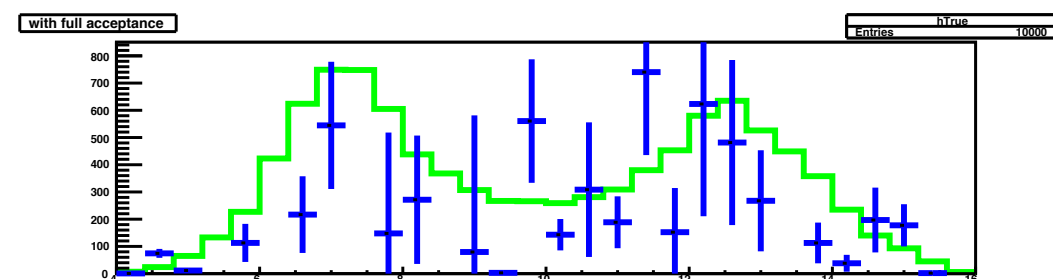
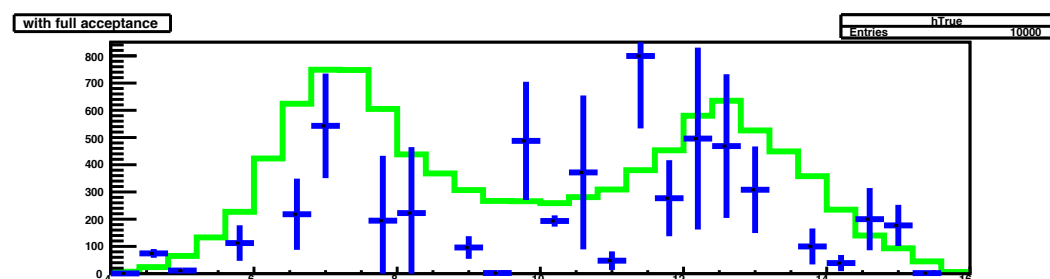
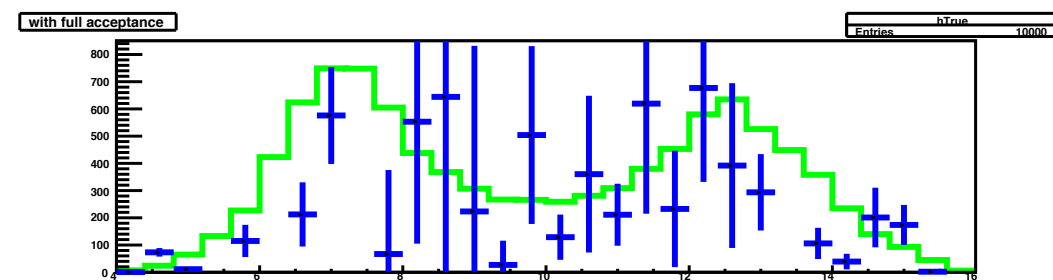
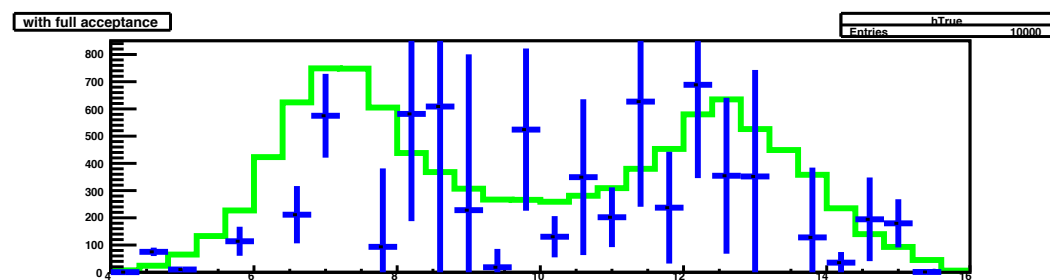
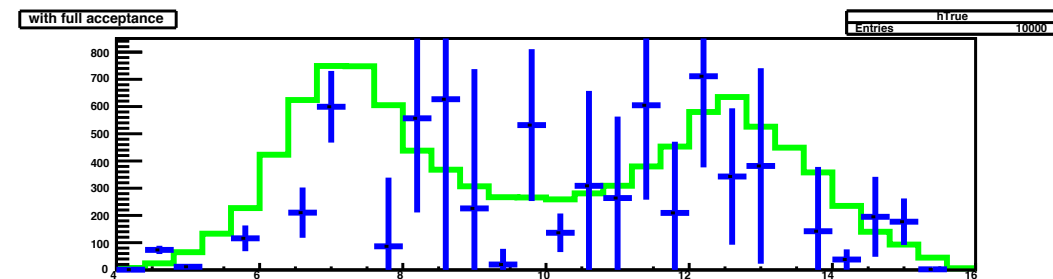
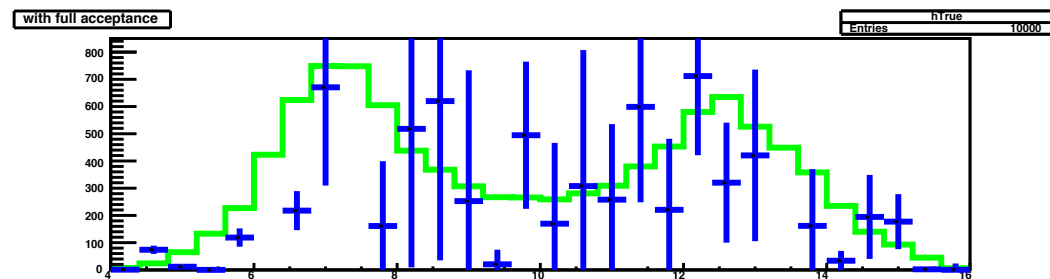
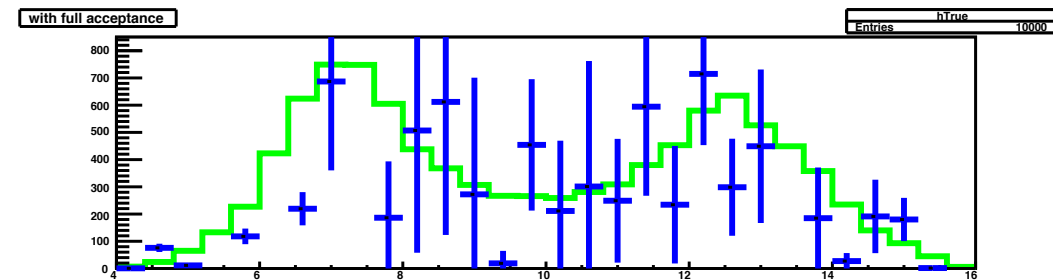
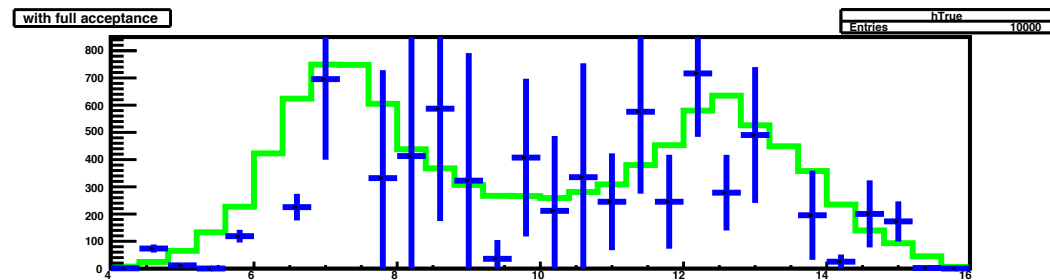
resolution = 0.5



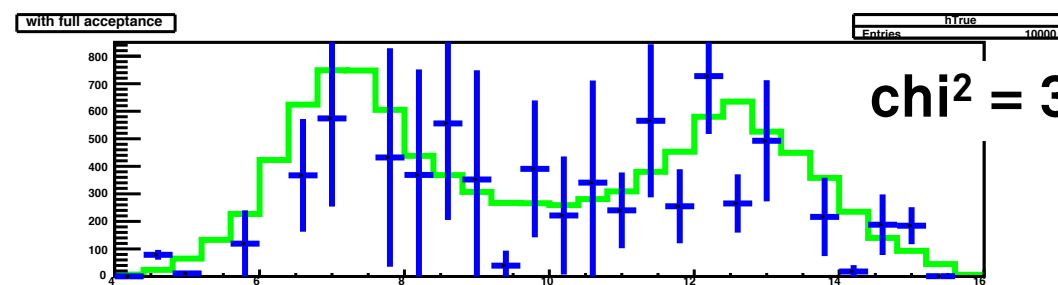
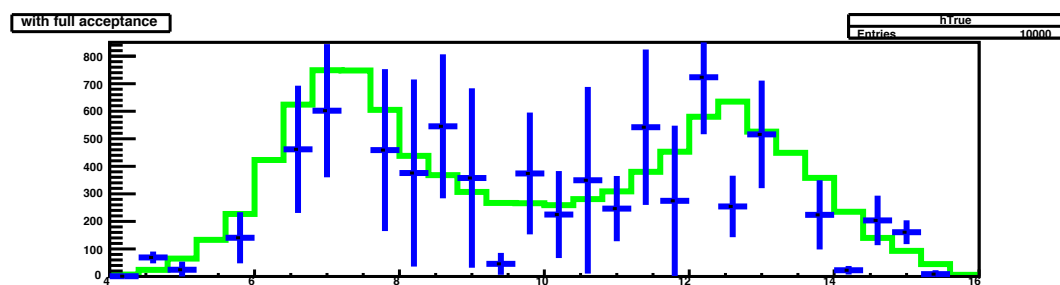
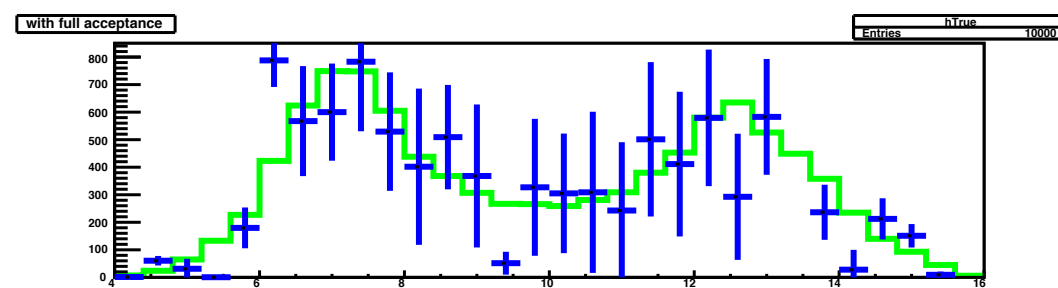
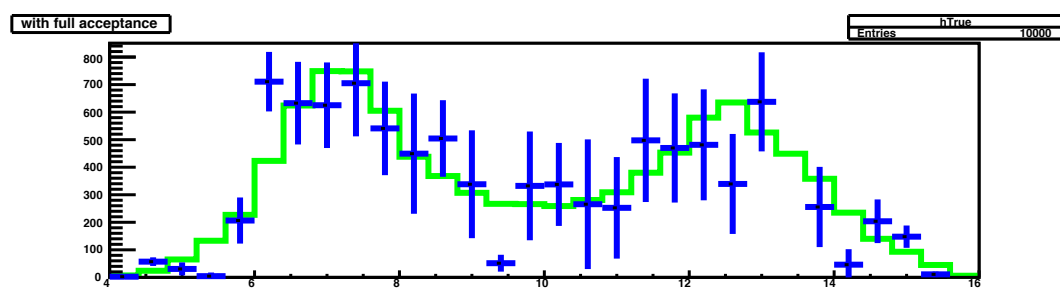
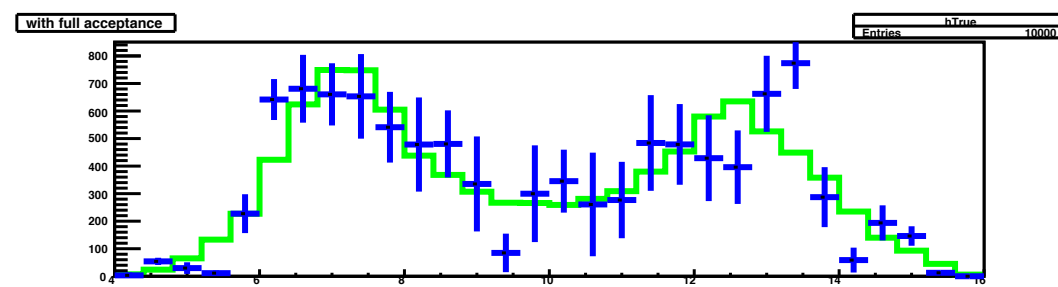
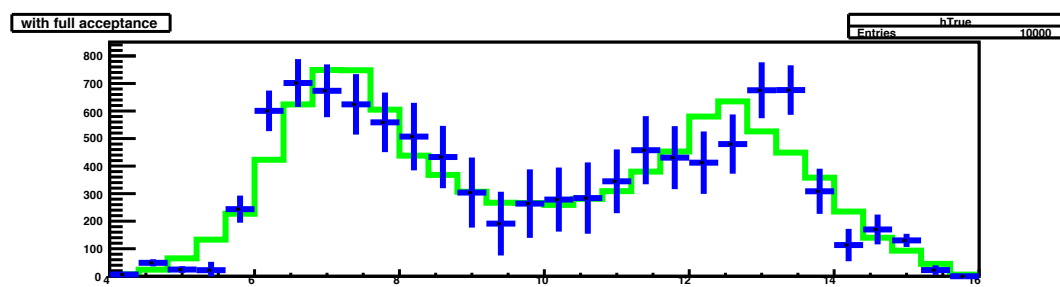
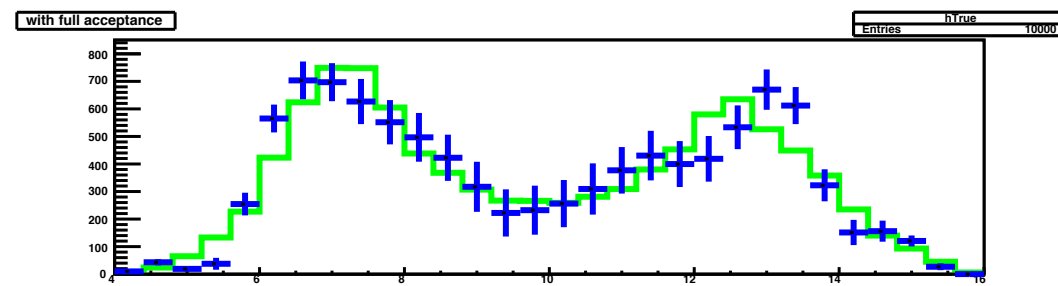
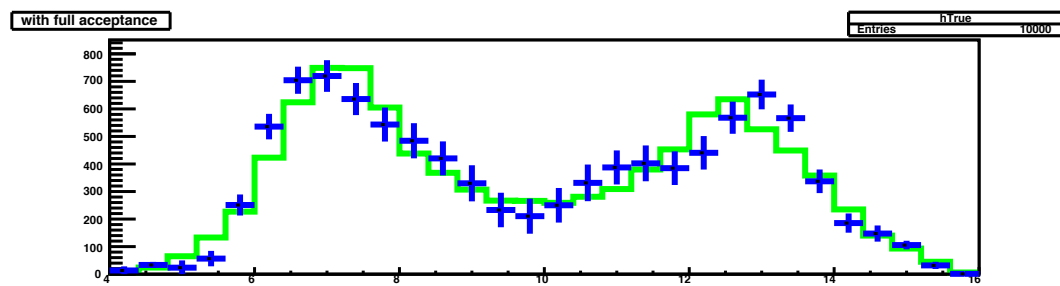
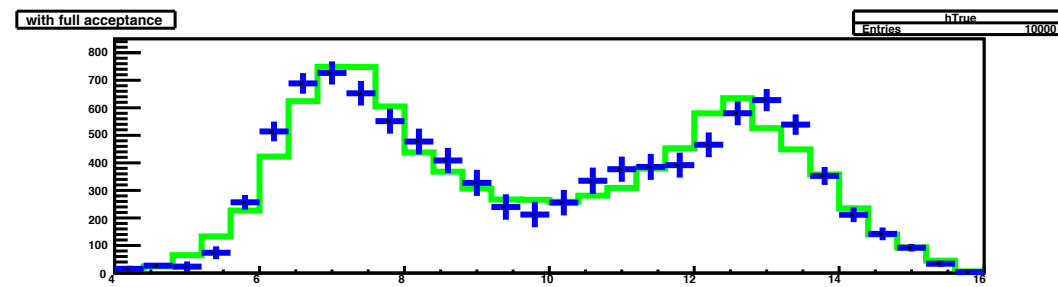
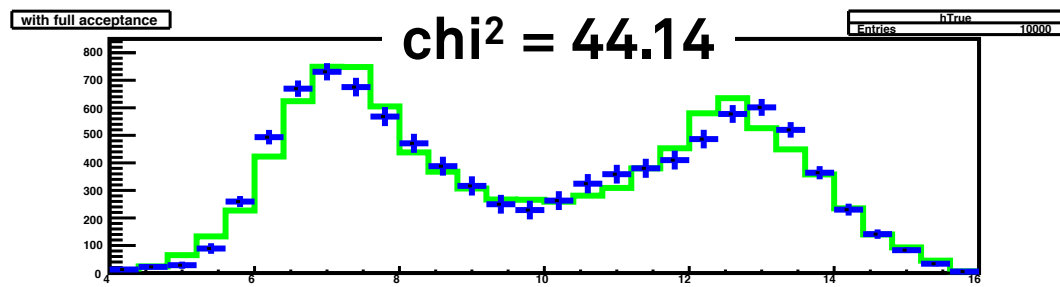
conclusion so far

- ▶ too many (still less than number of bins)
 - ▶ no reason to look at $\text{ndf} = 28$ anymore?
- ▶ no big influence of changing number of knots
- ▶ observe the behavior of unfolded distribution dependent of ndf with decreasing resolution

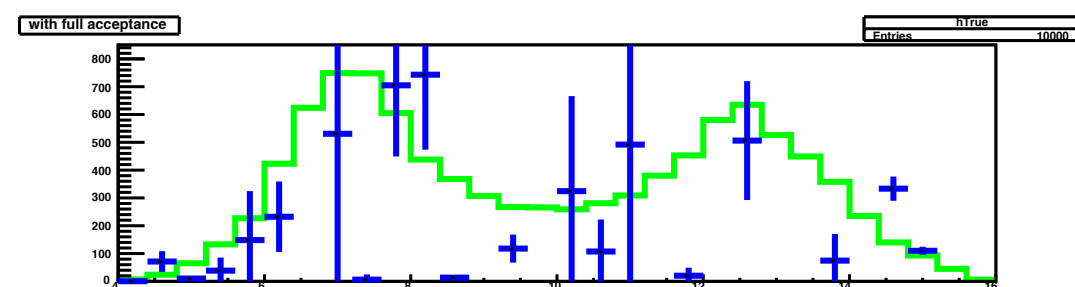
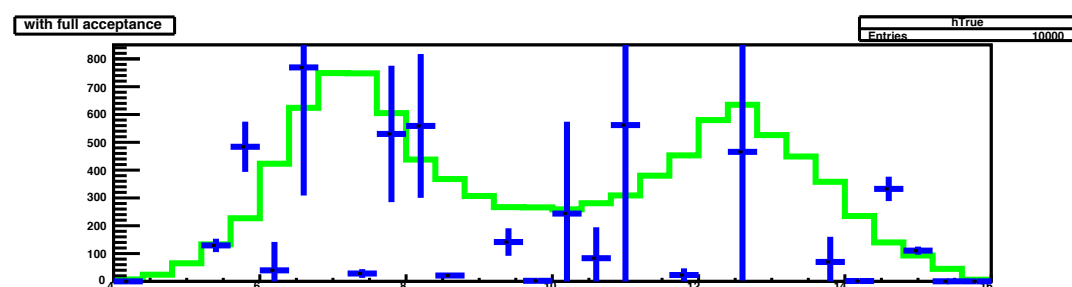
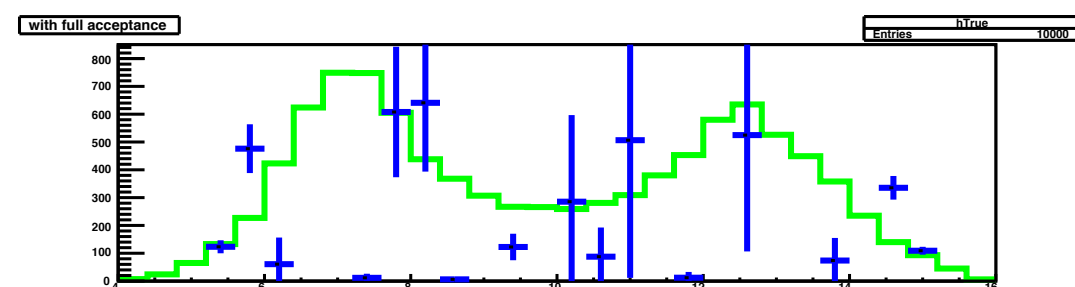
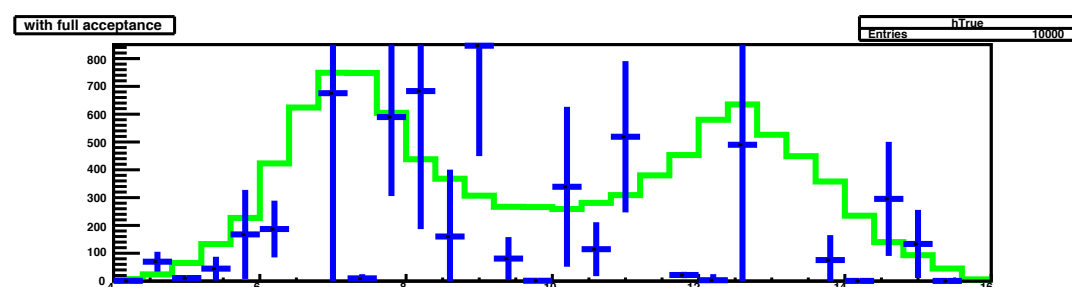
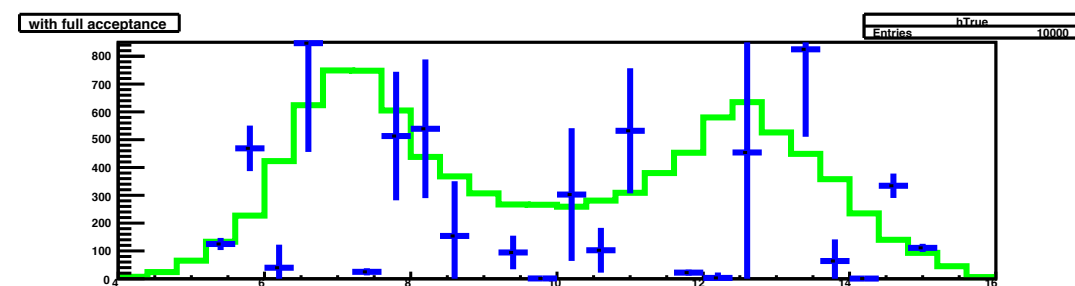
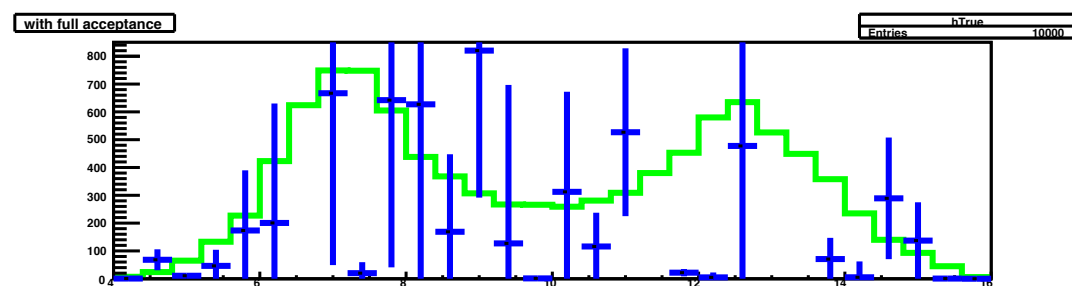
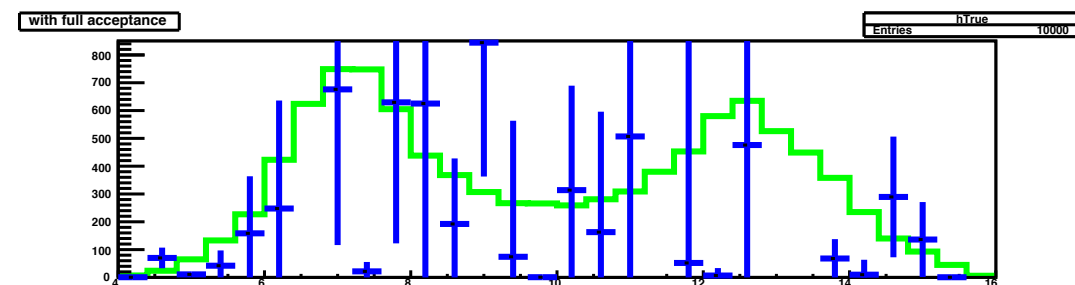
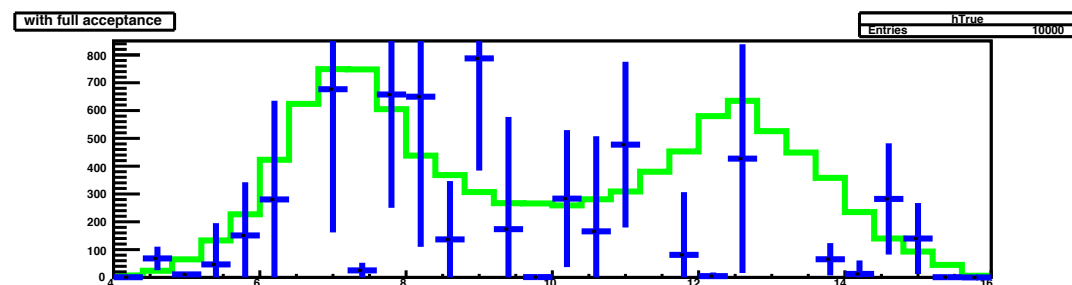
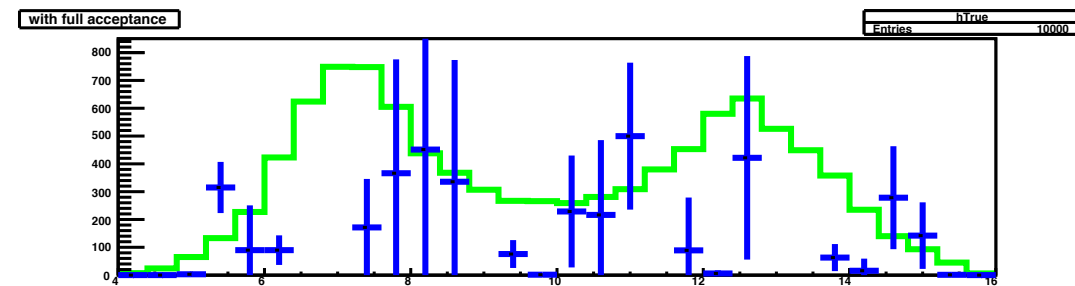
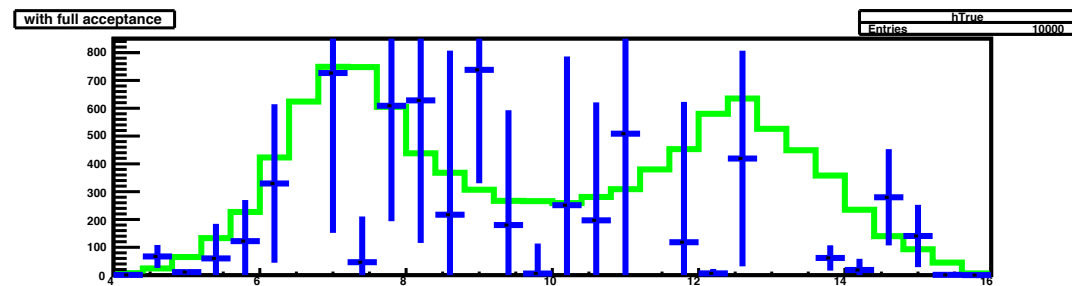
resolution = 0.75



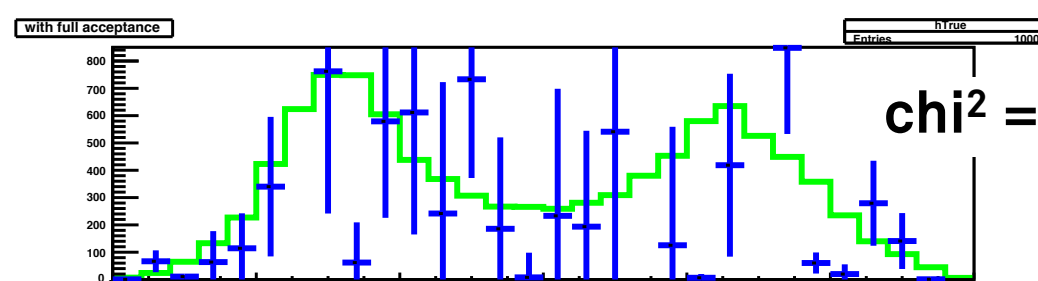
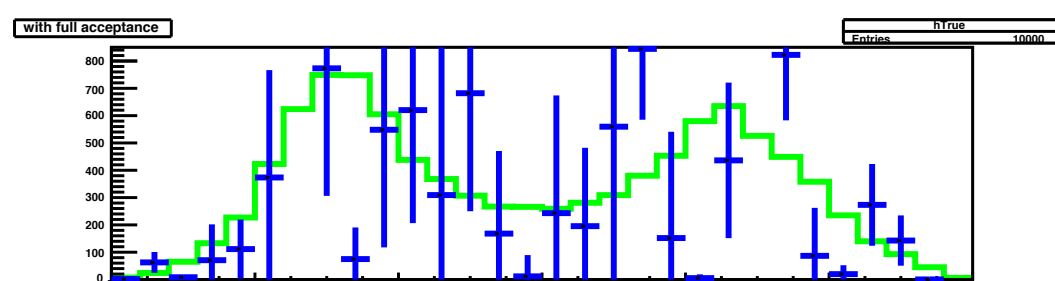
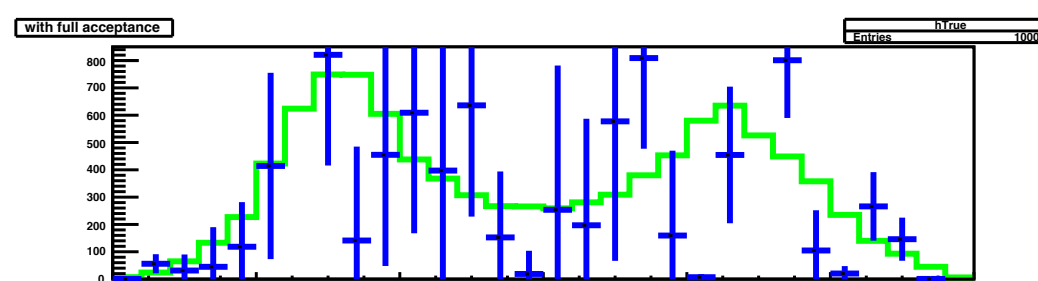
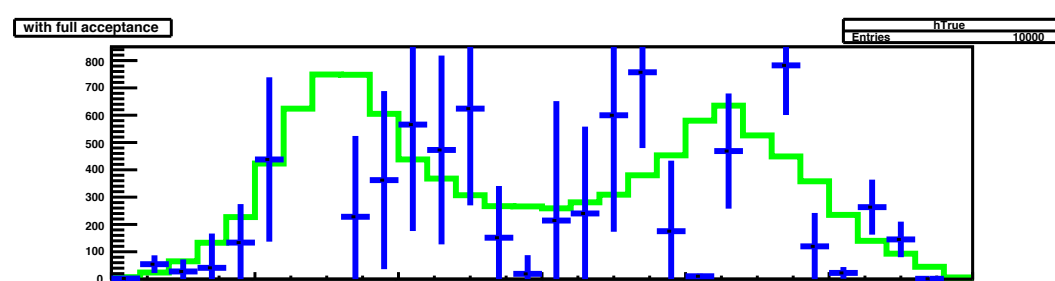
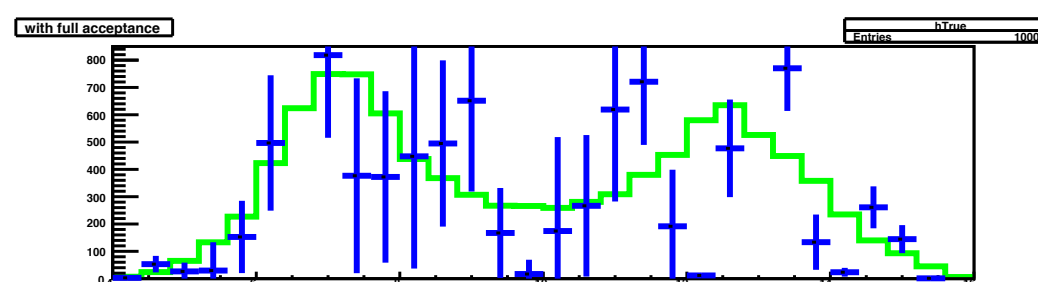
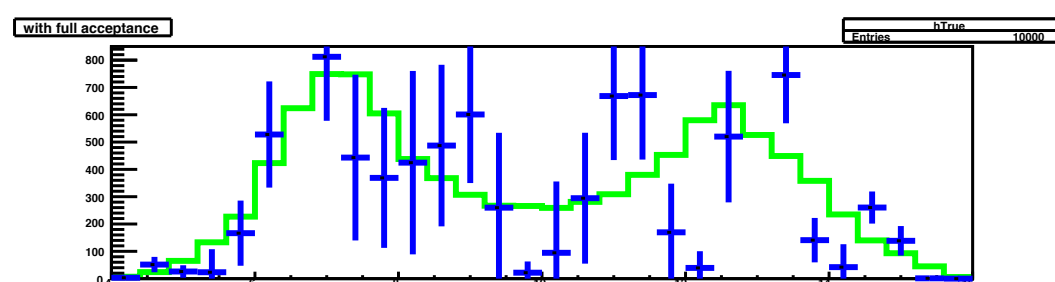
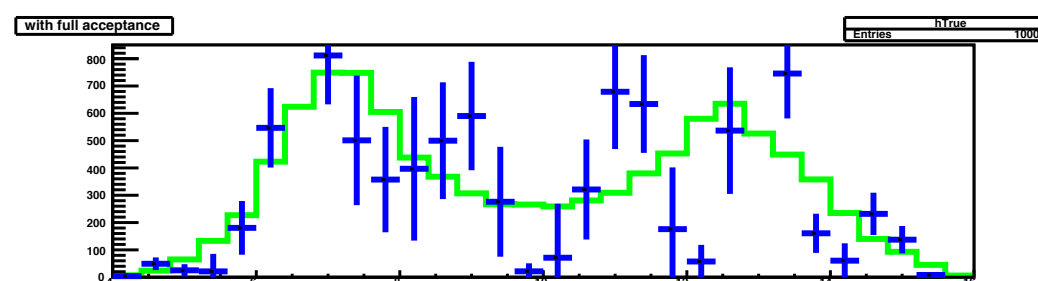
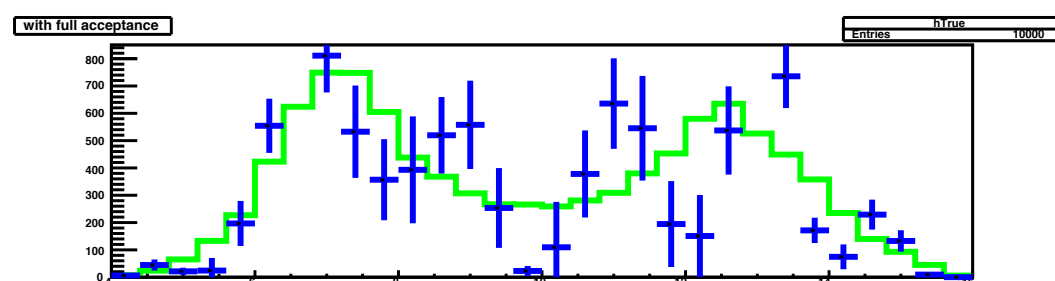
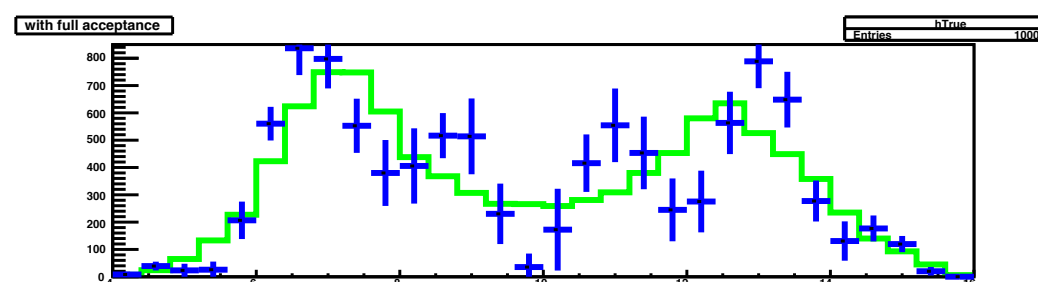
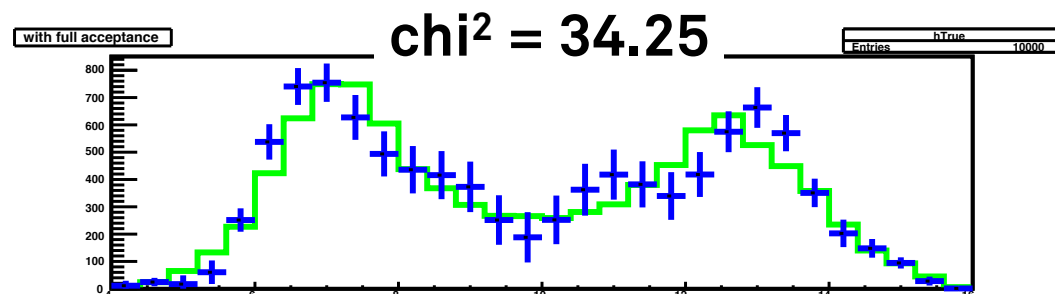
resolution = 0.75



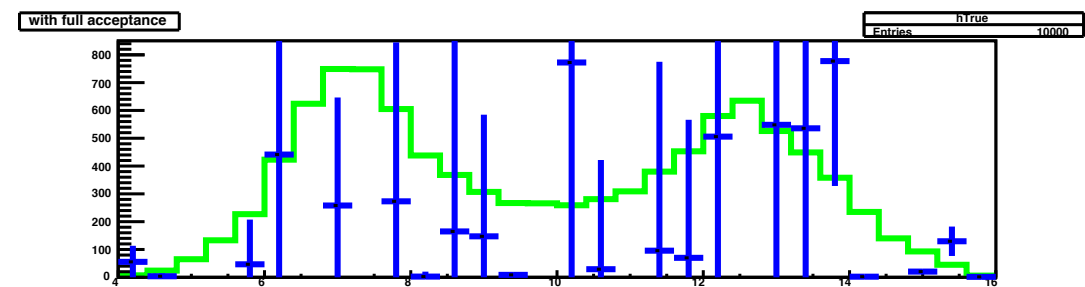
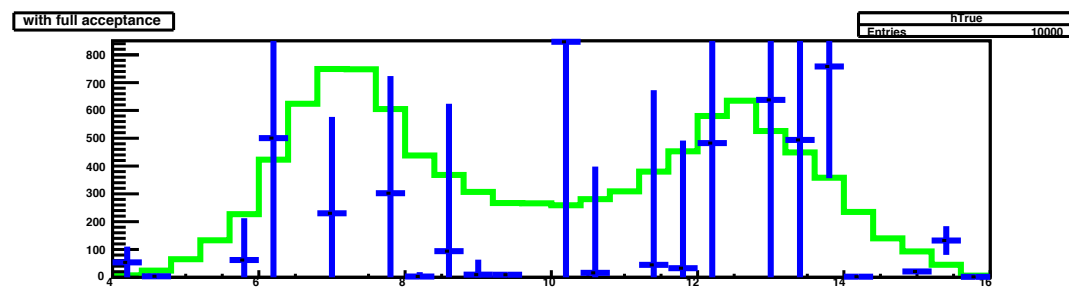
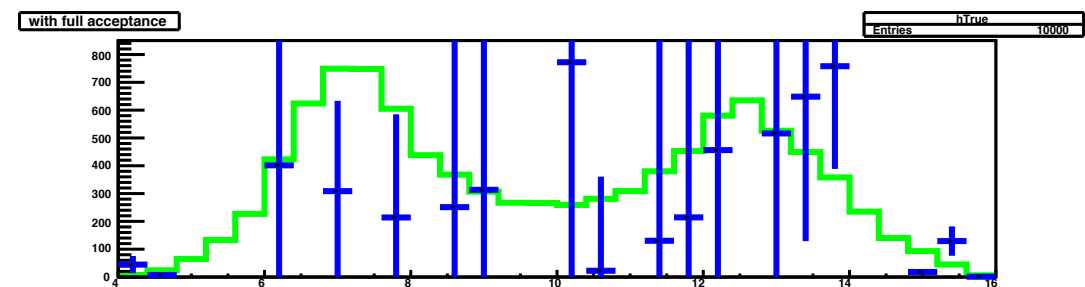
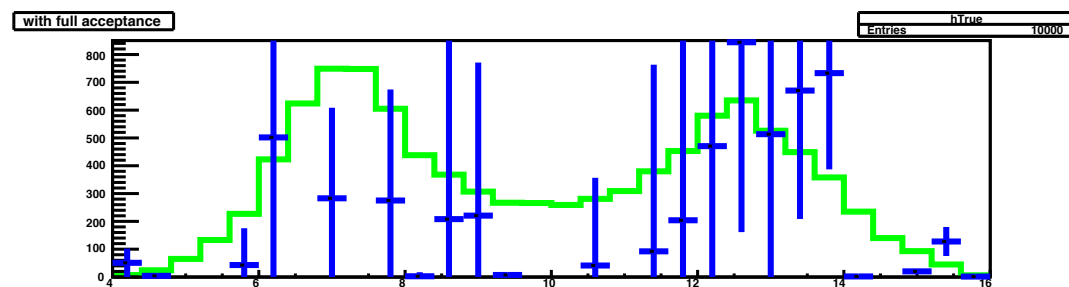
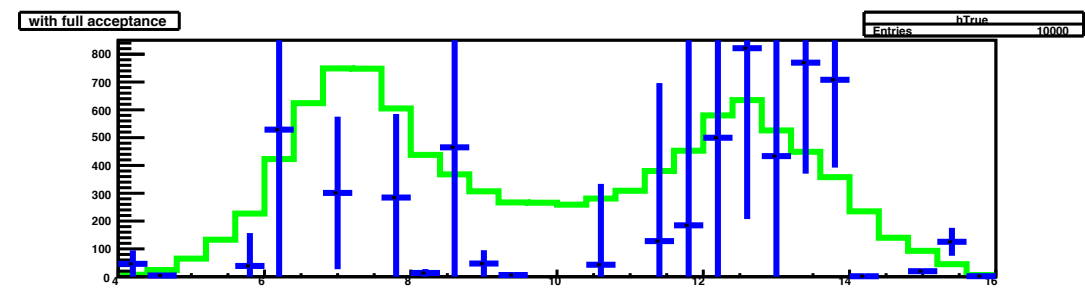
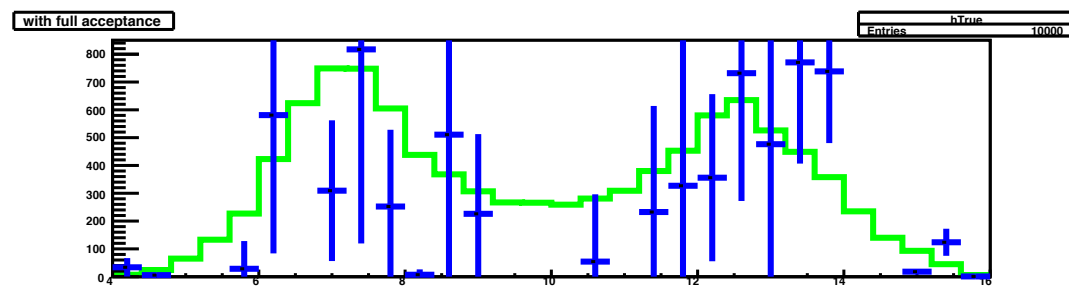
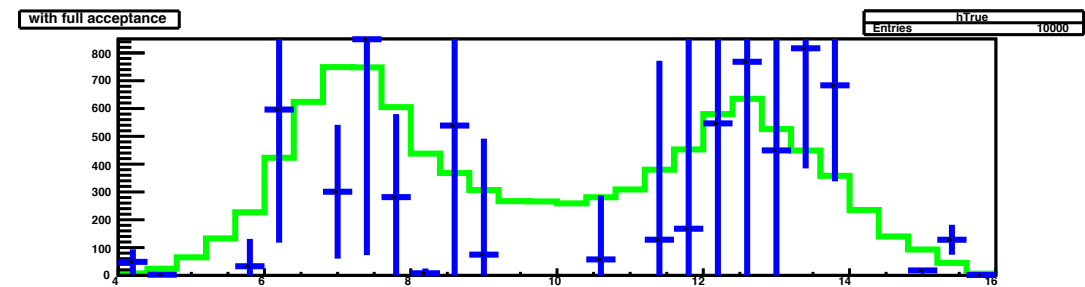
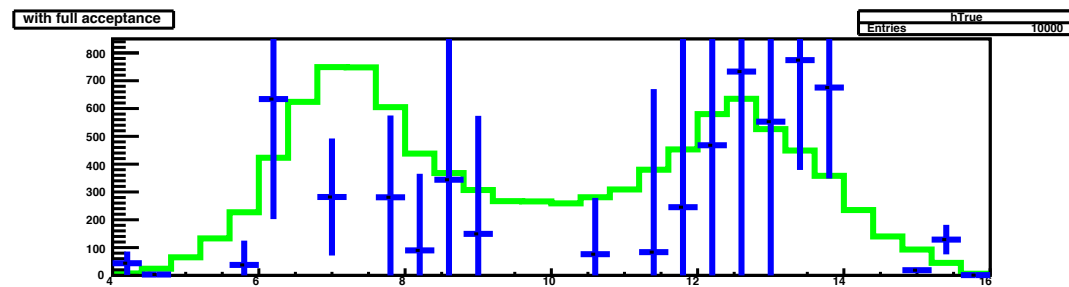
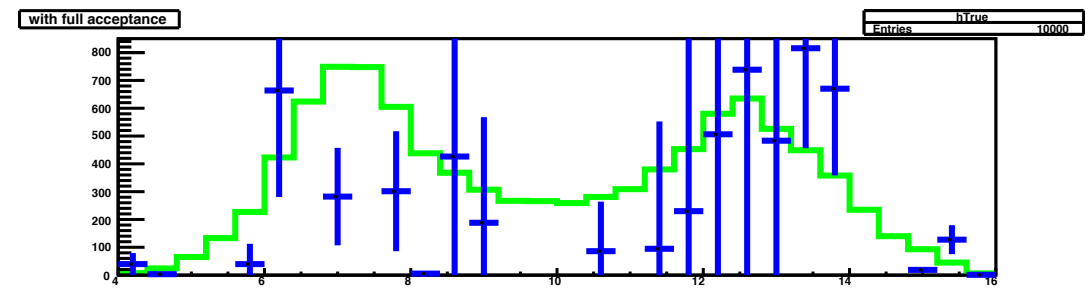
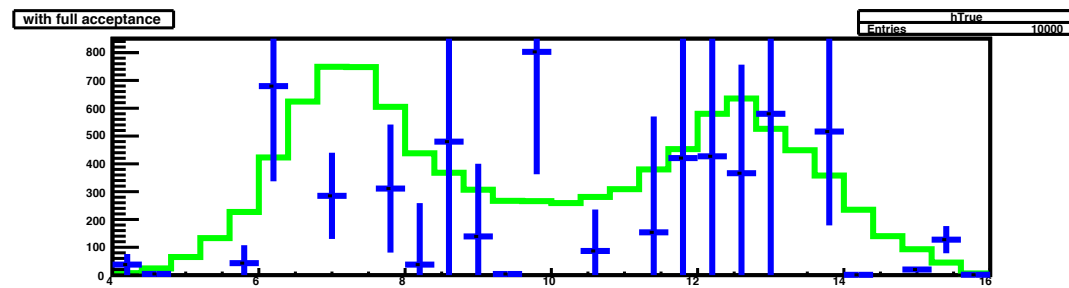
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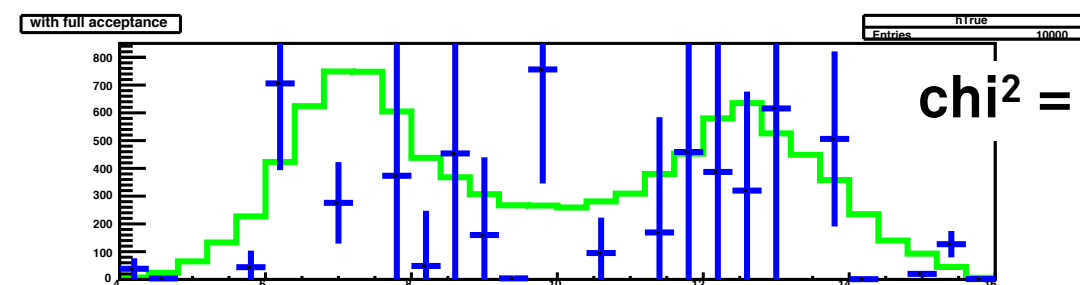
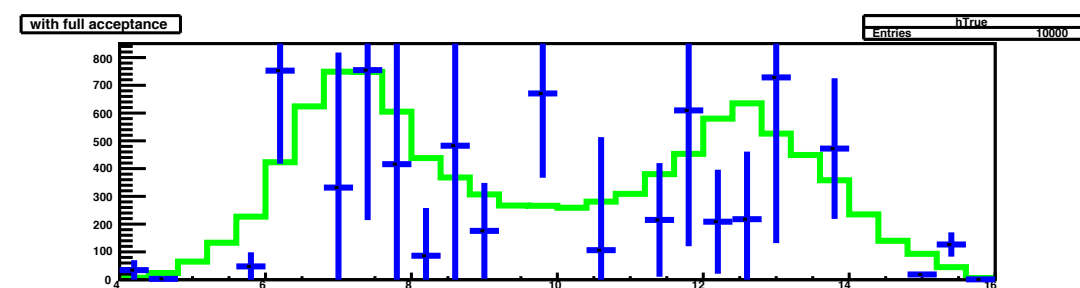
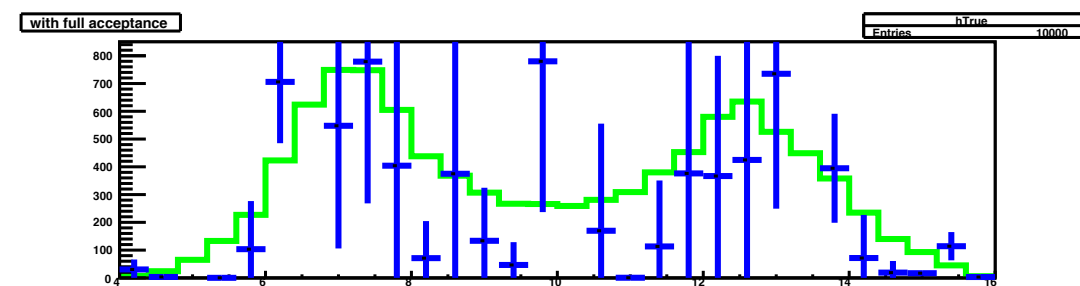
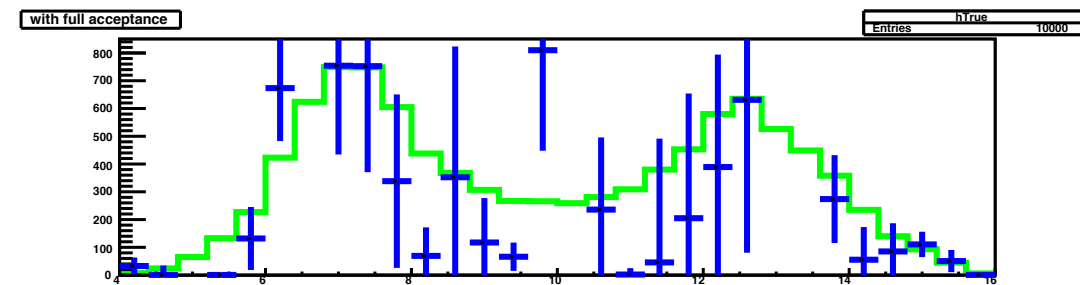
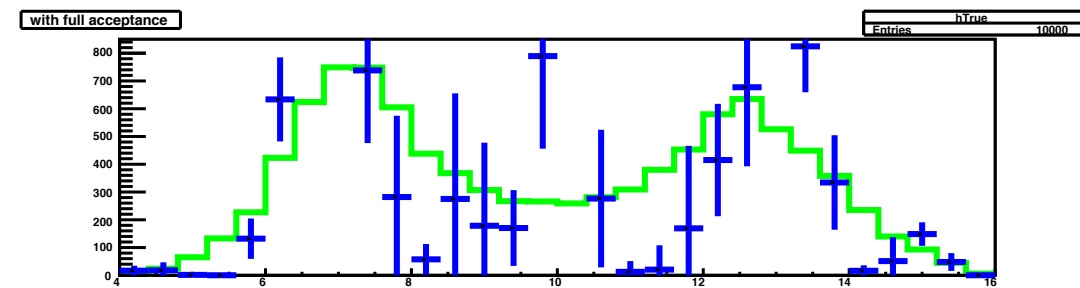
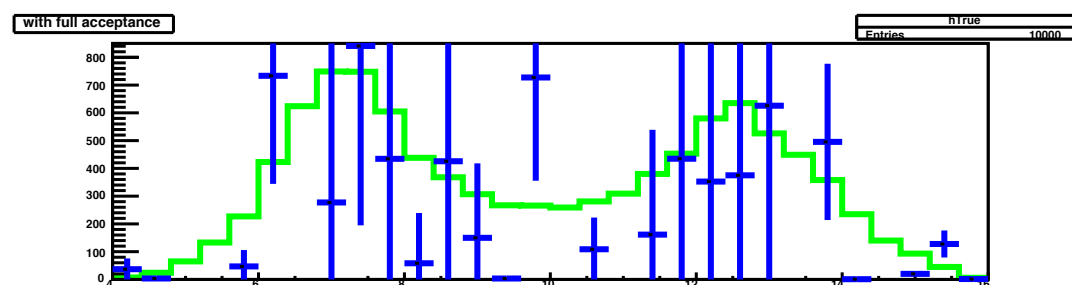
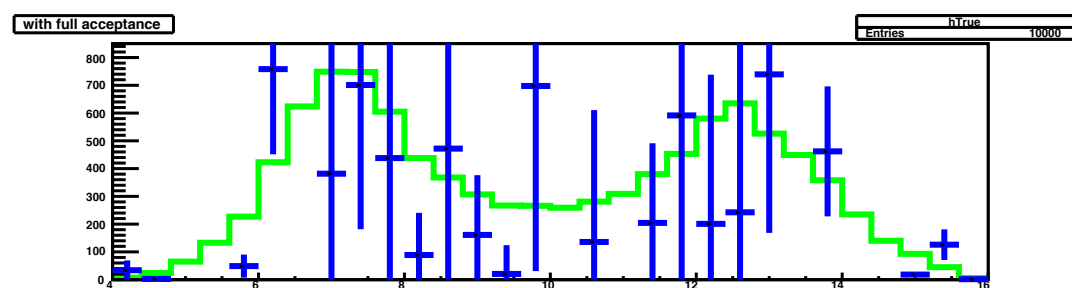
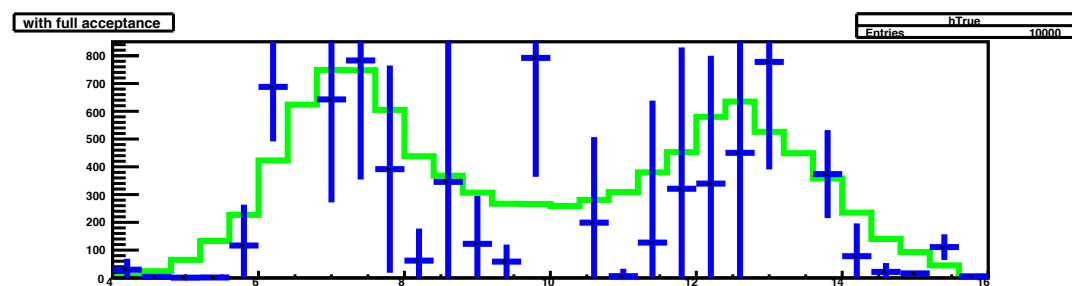
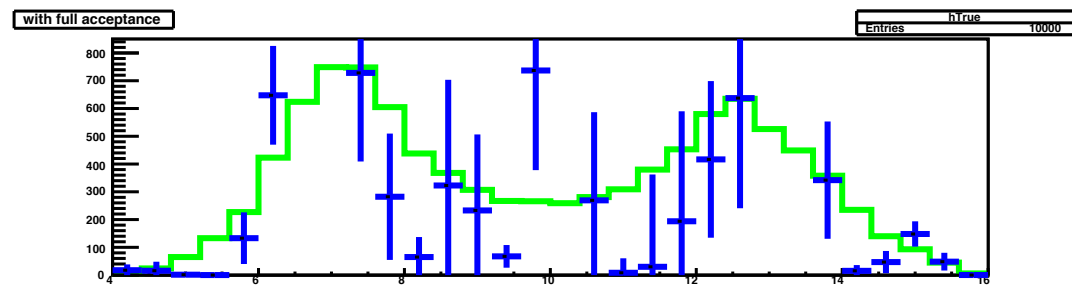
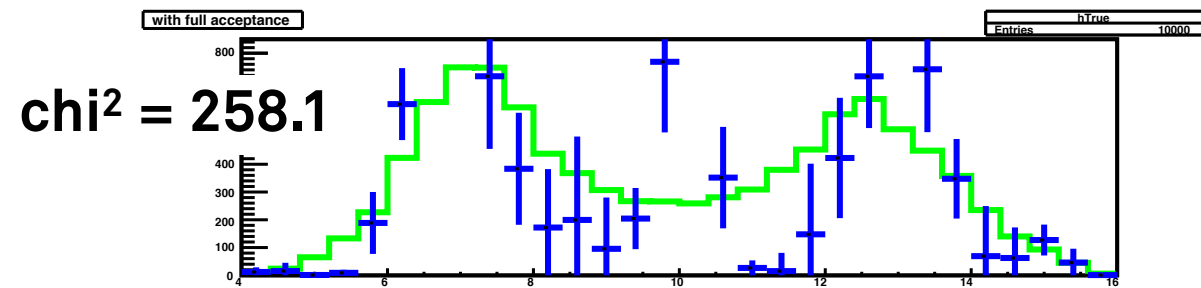
resolution = 1.0



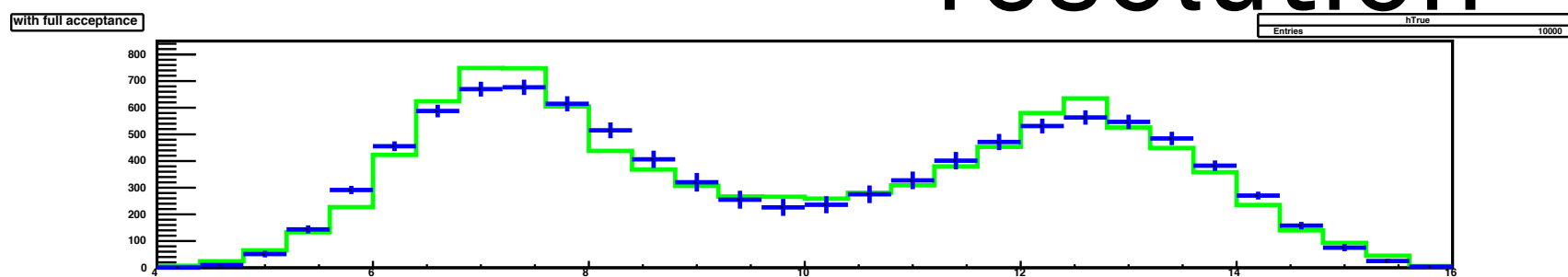
Proposed resolution = 1.5



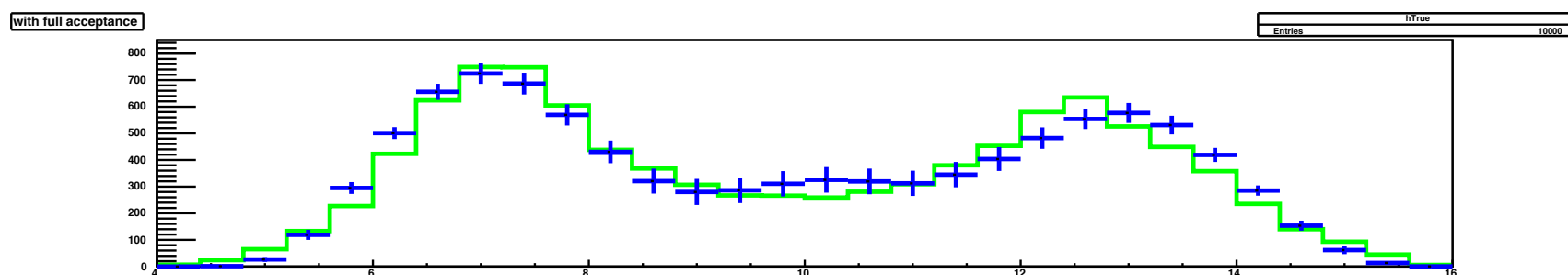
Proposed resolution = 1.5



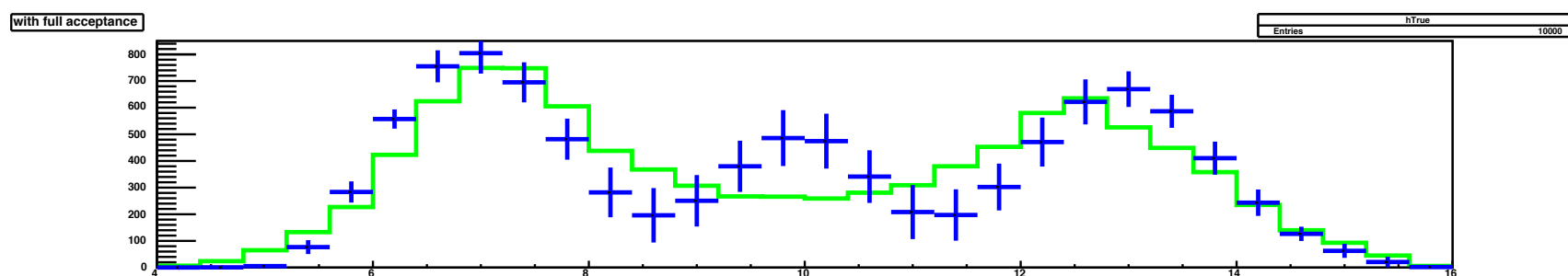
$\chi^2 = 54.1069$



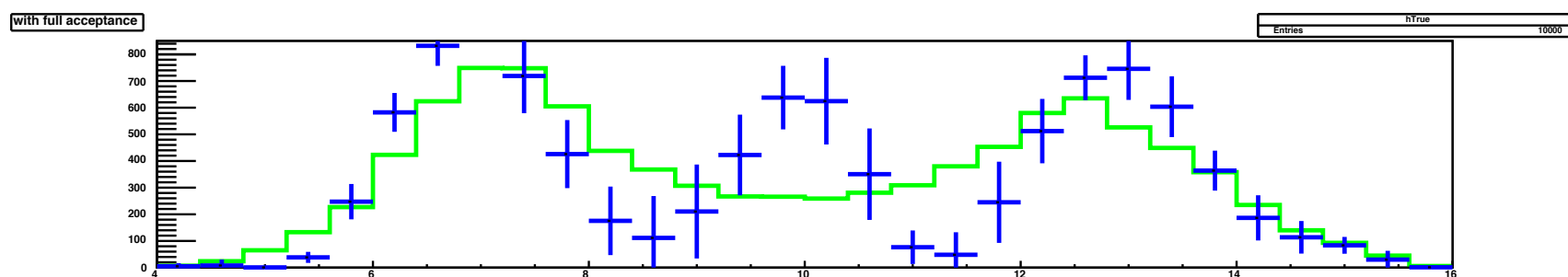
$\chi^2 = 102.304$



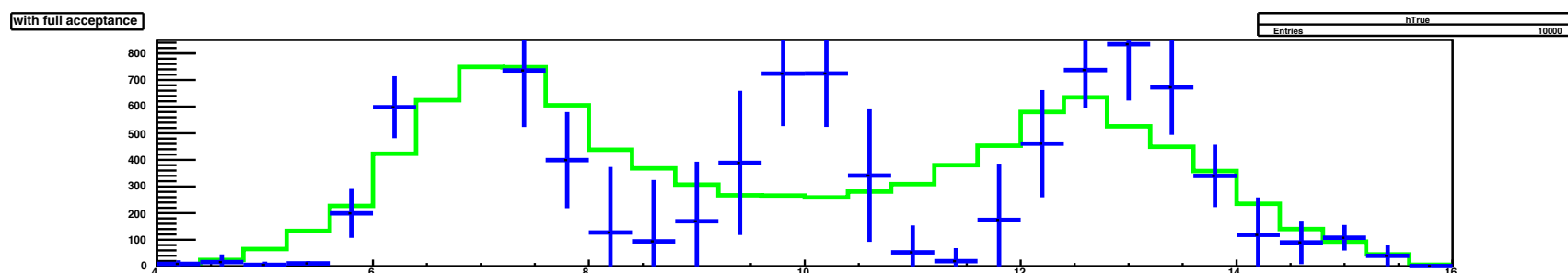
$\chi^2 = 139.477$



$\chi^2 = 151.534$



$\chi^2 = 176.154$



- $\text{ndf} = 6$ could be used for unfolding?

