

# Probability to lose $\pi_0$ using time window cut

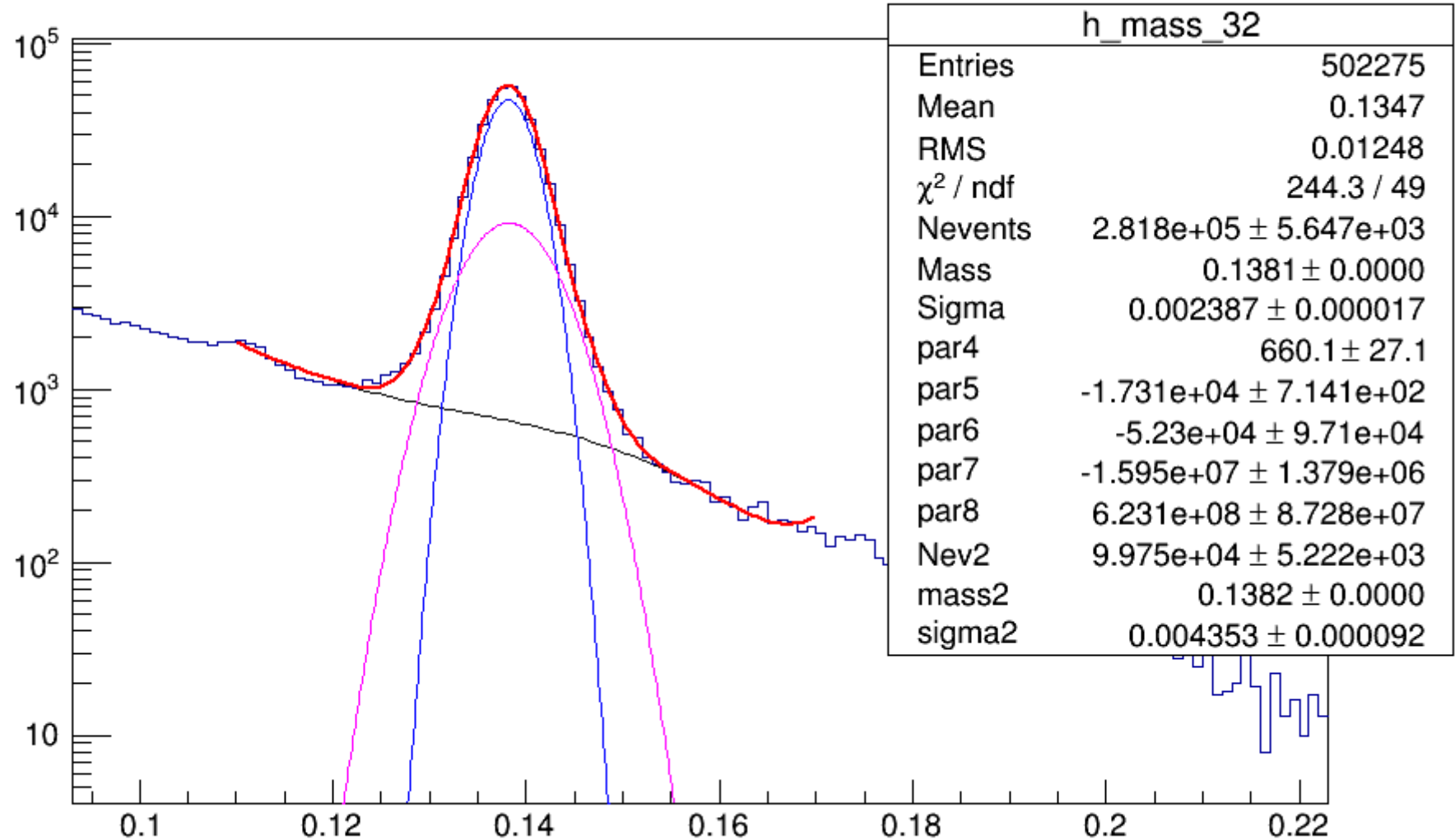
Victor Tarasov

# Applied cuts

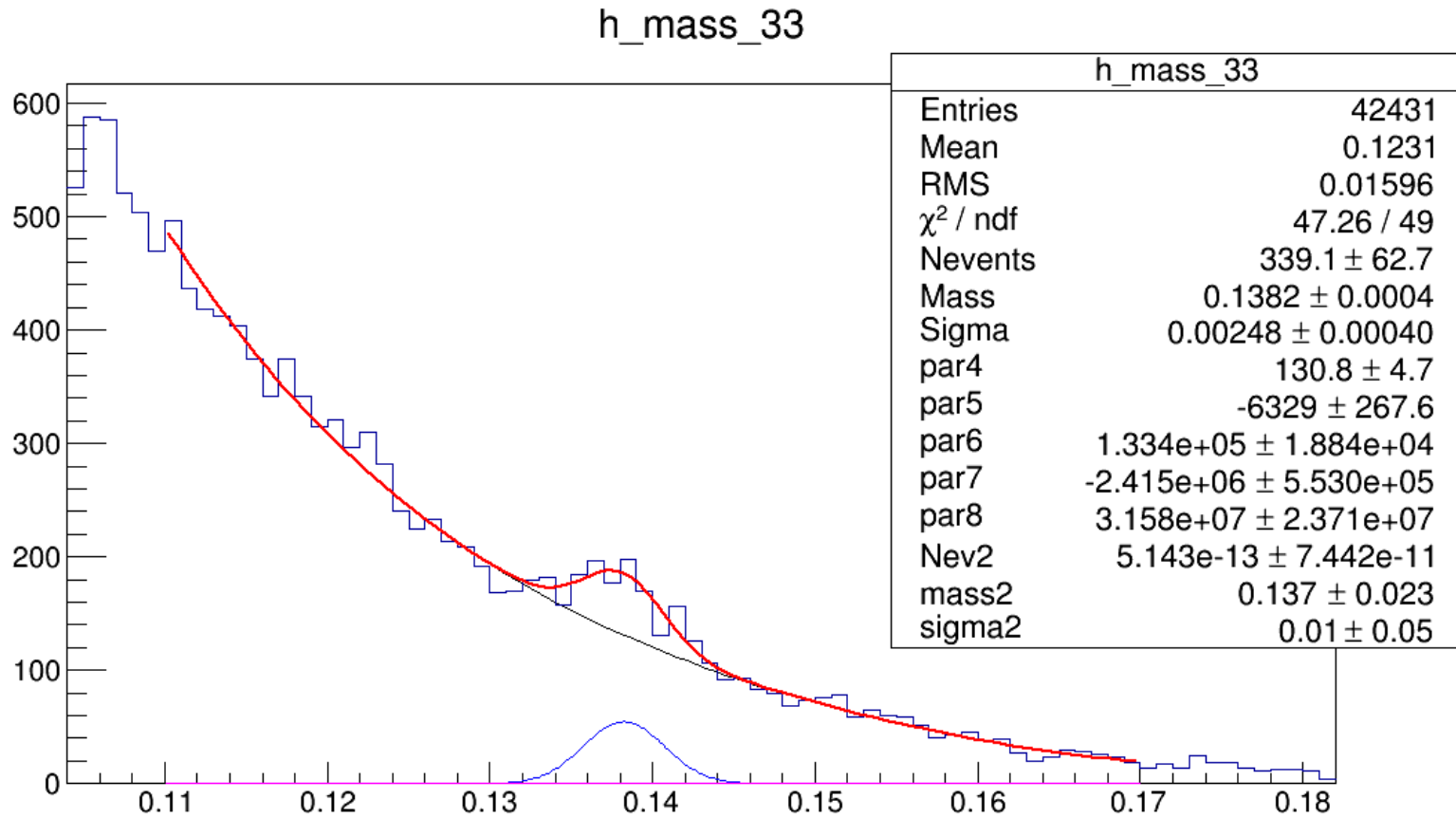
- 1) basic cut (each cluster energy greater than 0.5 GeV,  $3.5 \text{ GeV} < E_{\text{cl1}} + E_{\text{cl2}} < 6.0 \text{ GeV}$ )  
follow in text - “No cuts”
- 2) basic cut +  $|t_{\text{diff}}| < 20 \text{ ns}$ ;
- 3) basic cut +  $|t_{\text{diff}}| < 20 \text{ ns}$  + elasticity cut  
elasticity cut  $| E_{\text{cl1}} + E_{\text{cl2}} / E_{\text{beam}} - 1 | < 0.05$

# Time window cut $\pm 10\text{ns}$

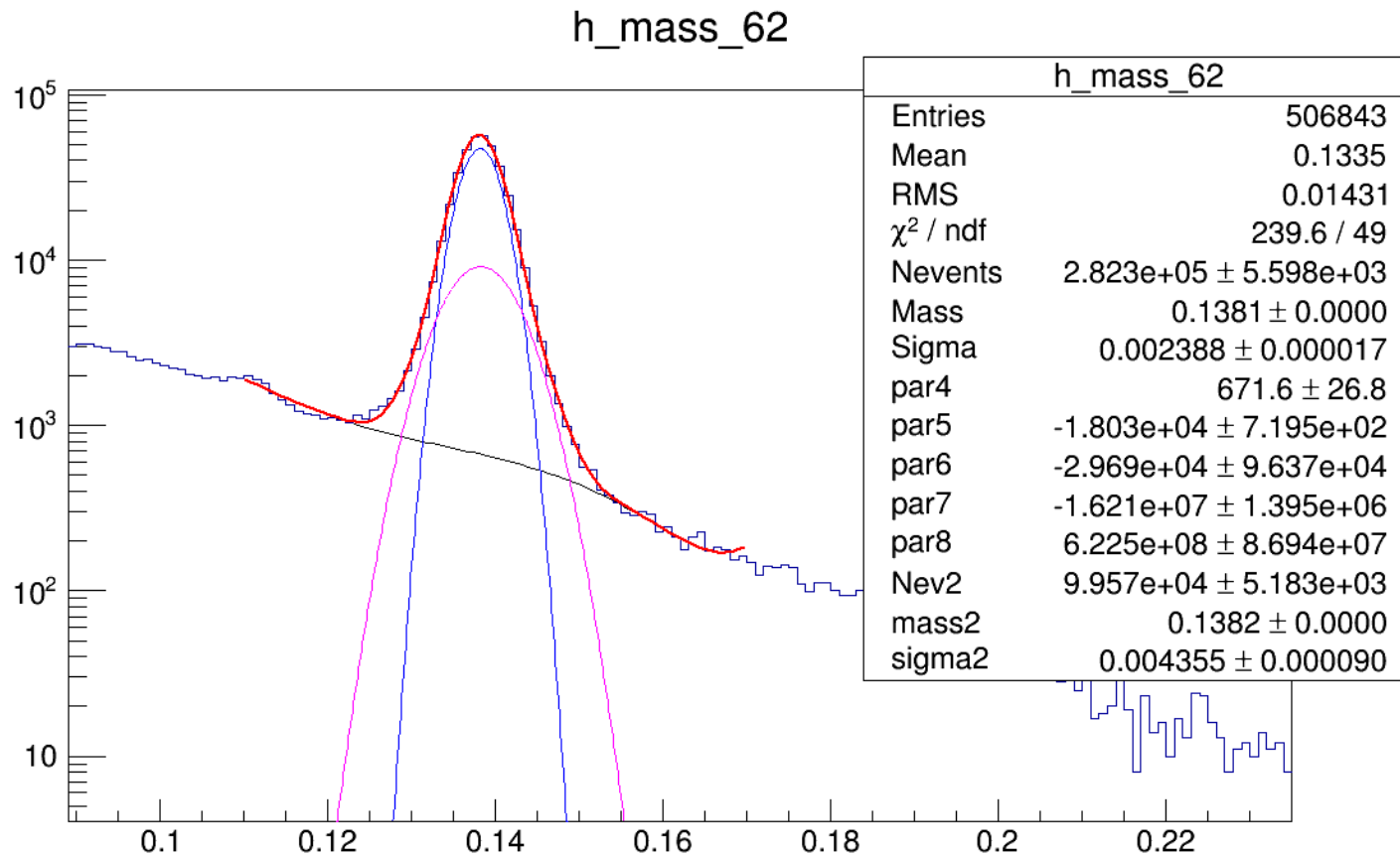
h\_mass\_32



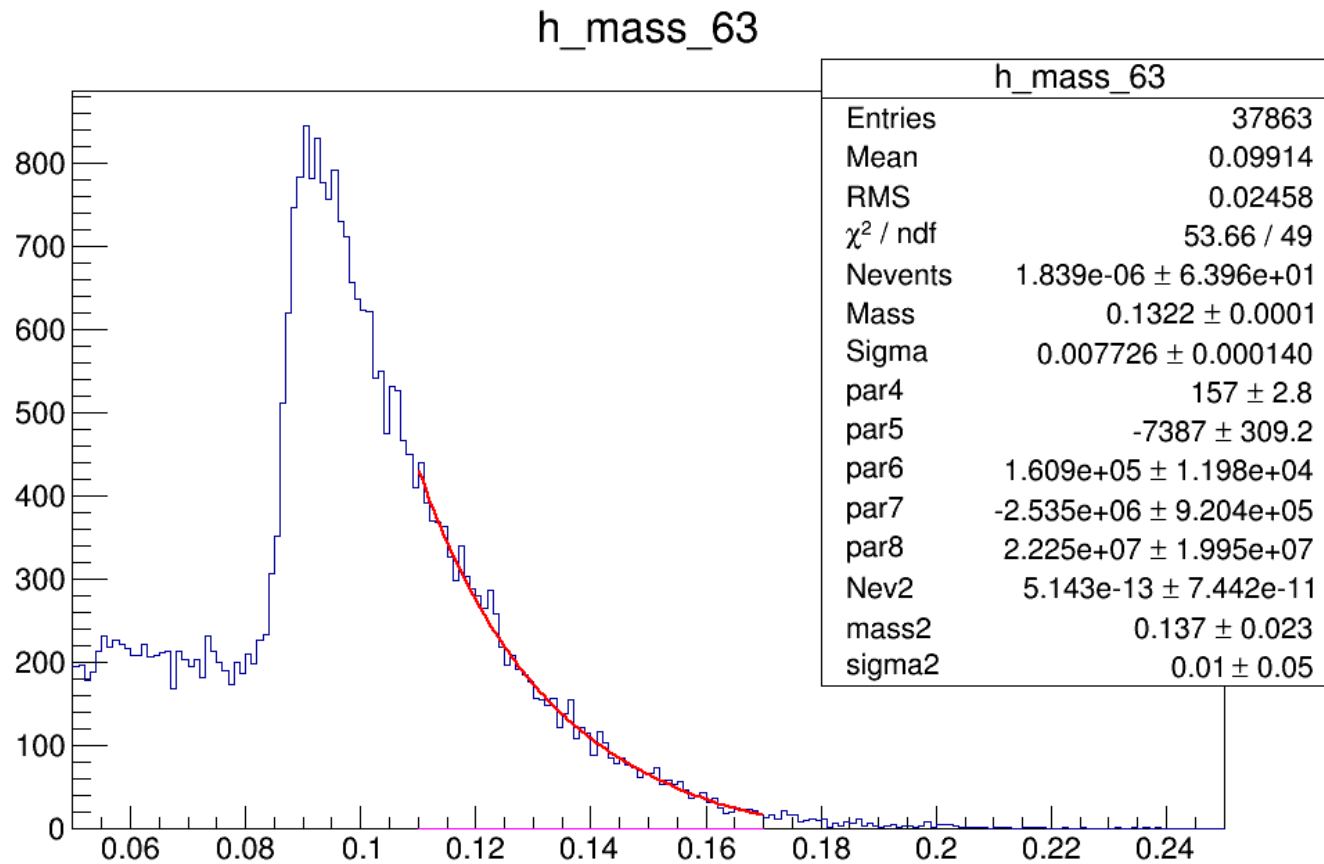
# Out of +-10ns



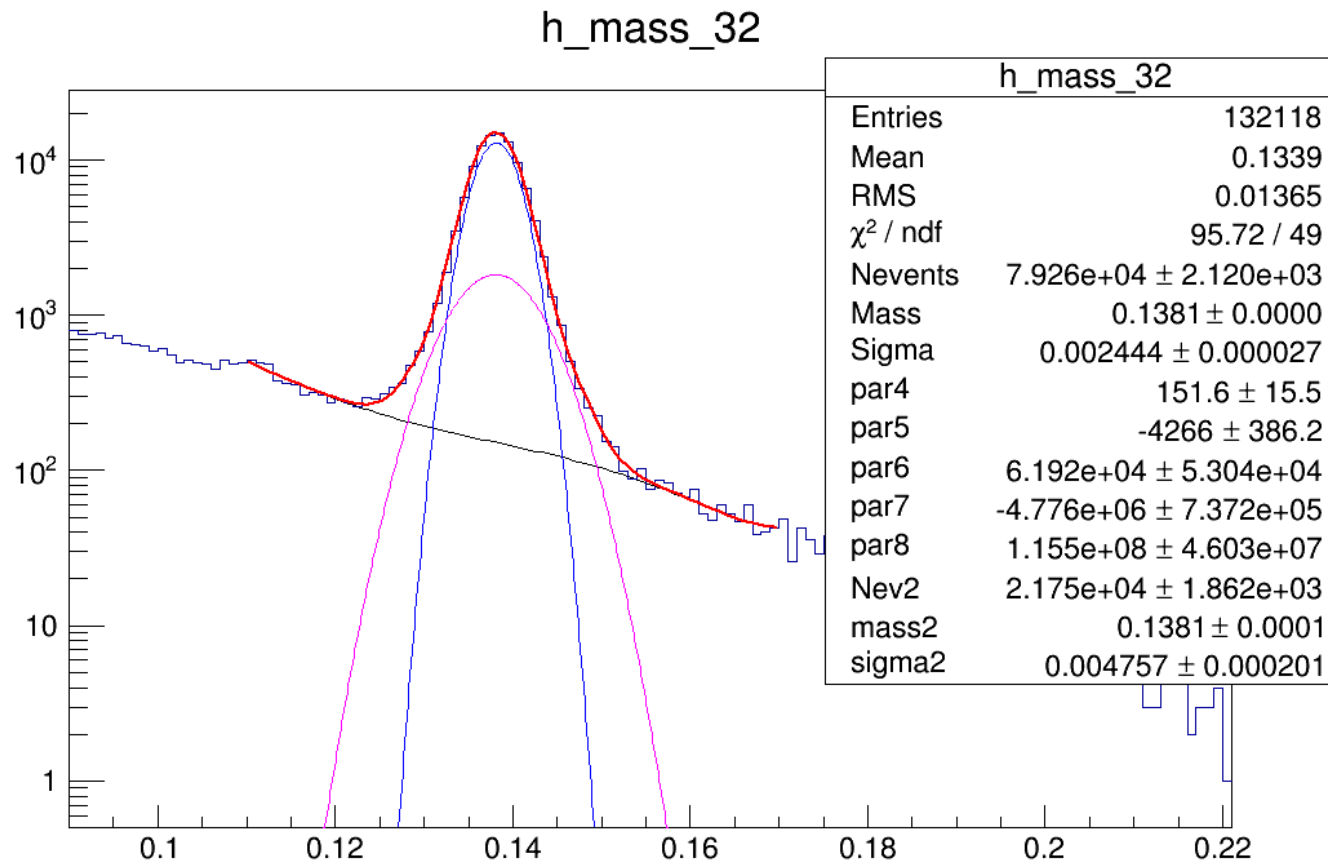
# Inside +/- 20ns



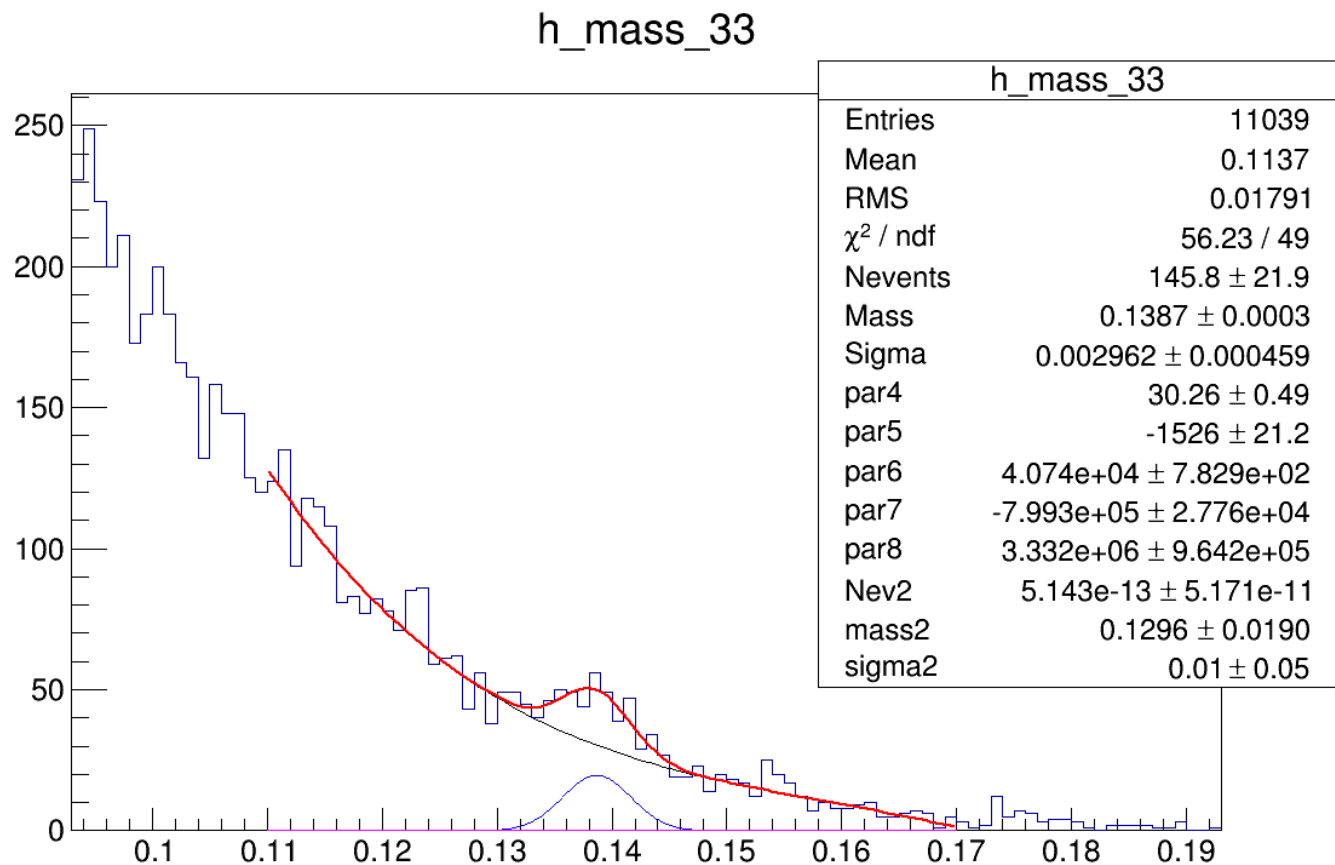
# Outside $\pm 20\text{ns}$



# $|t_{diff}| < 20\text{ns}$ , inside $\pm 10\text{ns}$

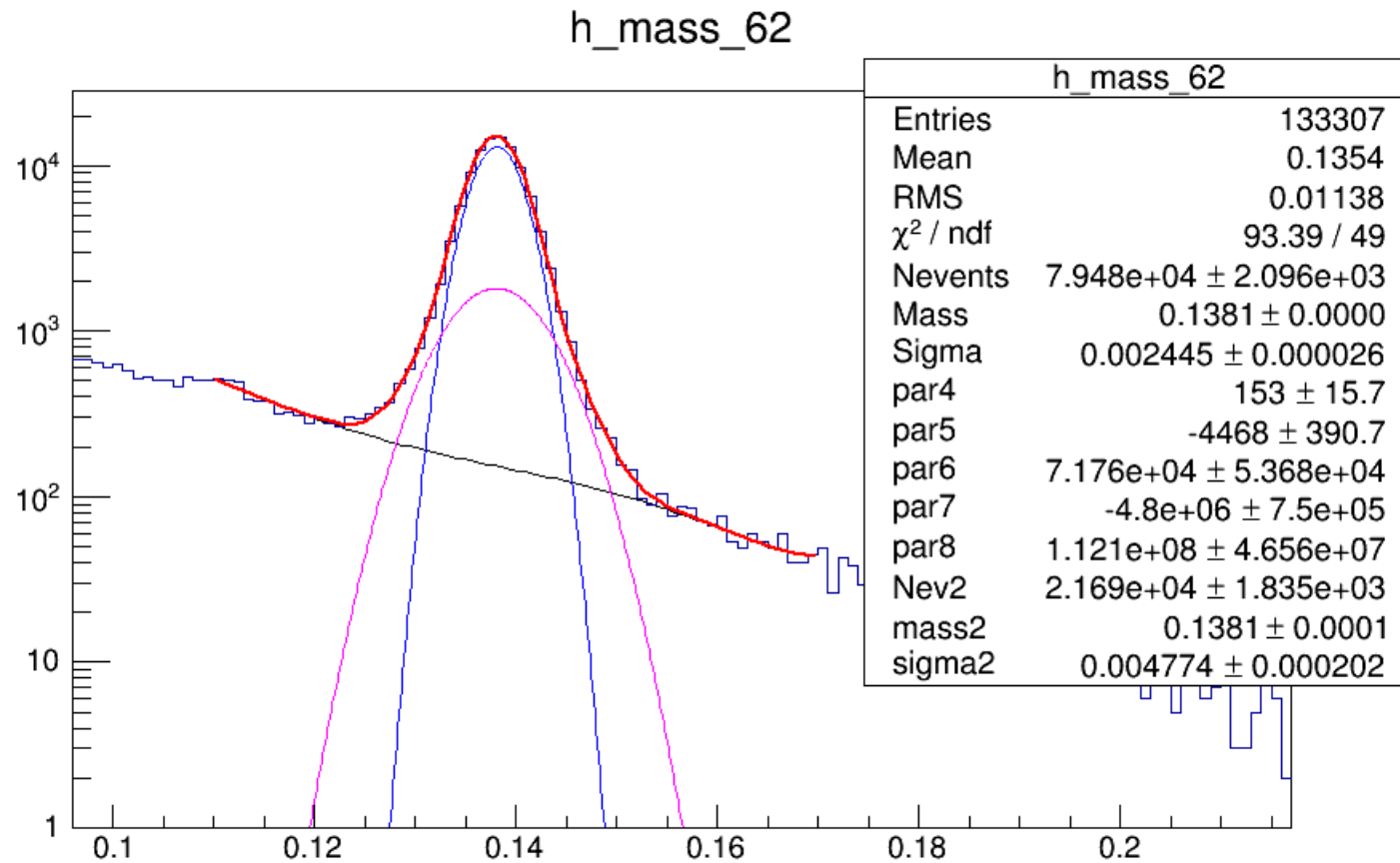


# $|tdiff| < 20\text{ns}$ , out of $\pm 10\text{ns}$ time window



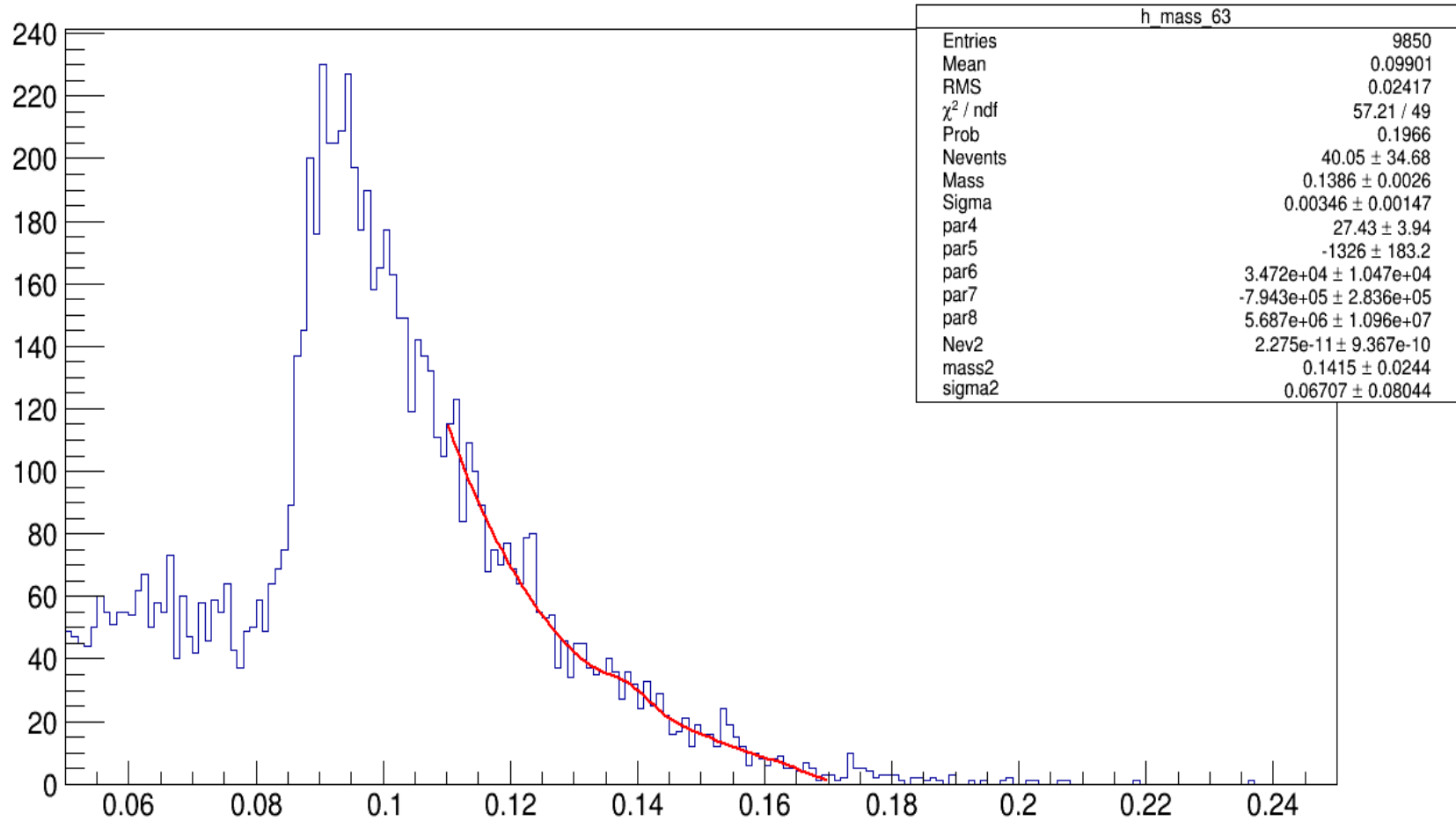


# Inside $\pm 20\text{ns}$

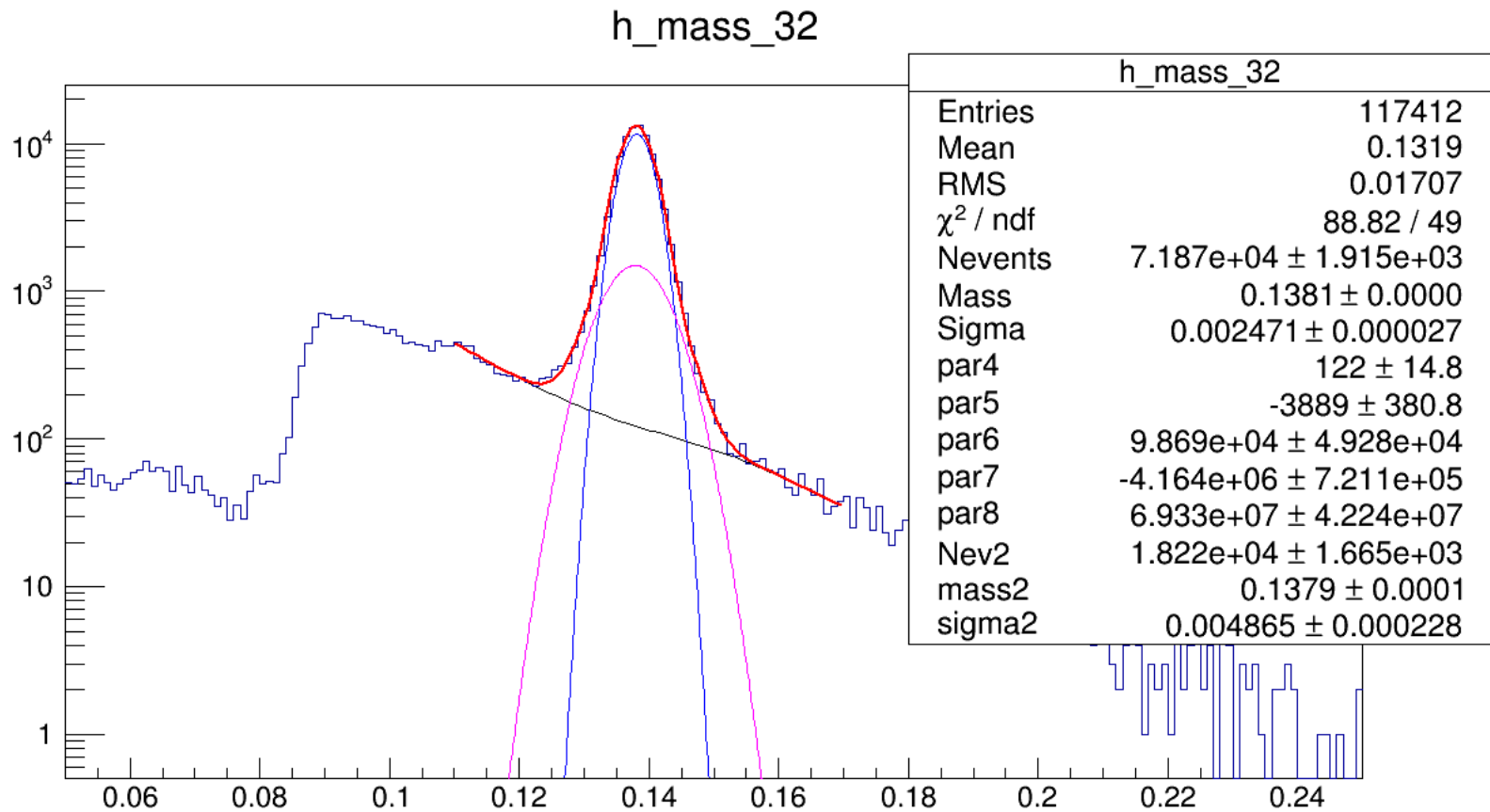


# Outside $\pm 20\text{ns}$

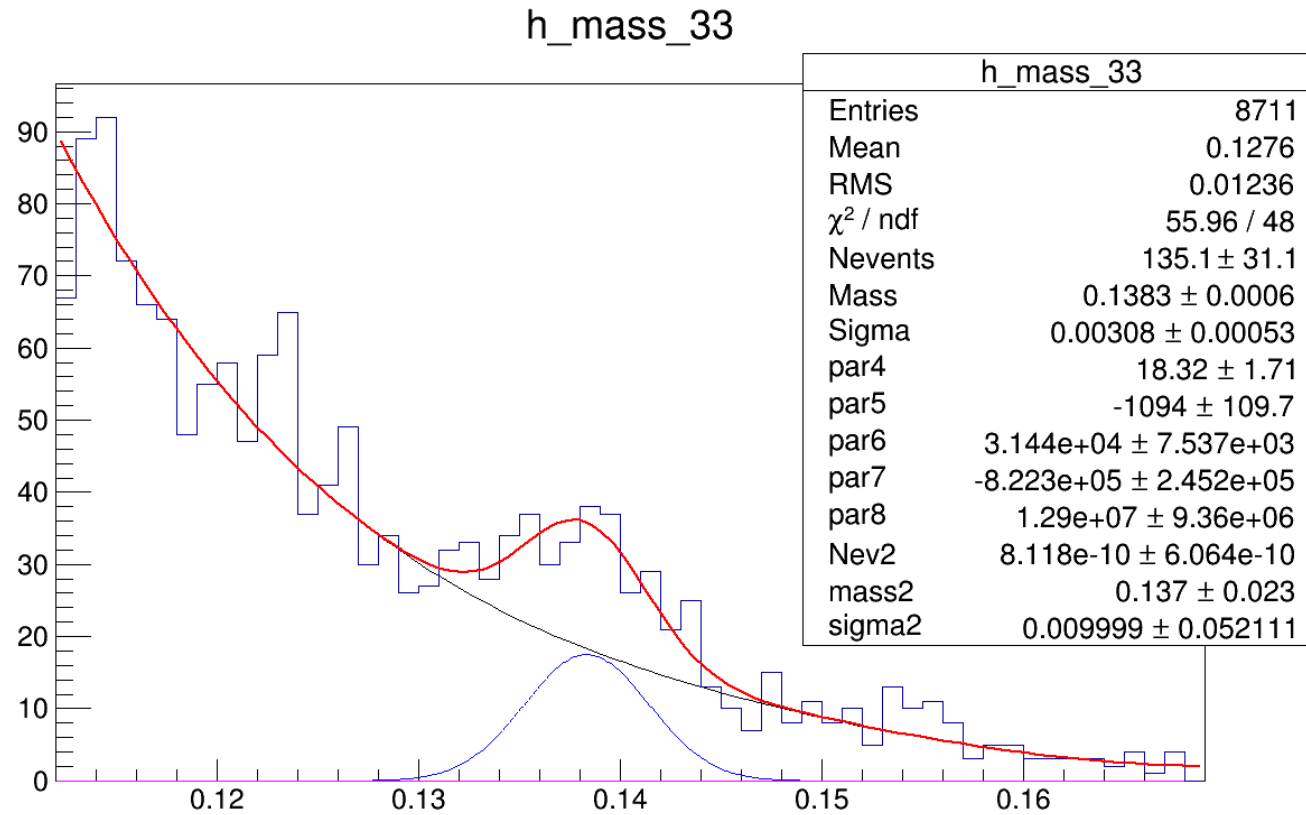
h\_mass\_63



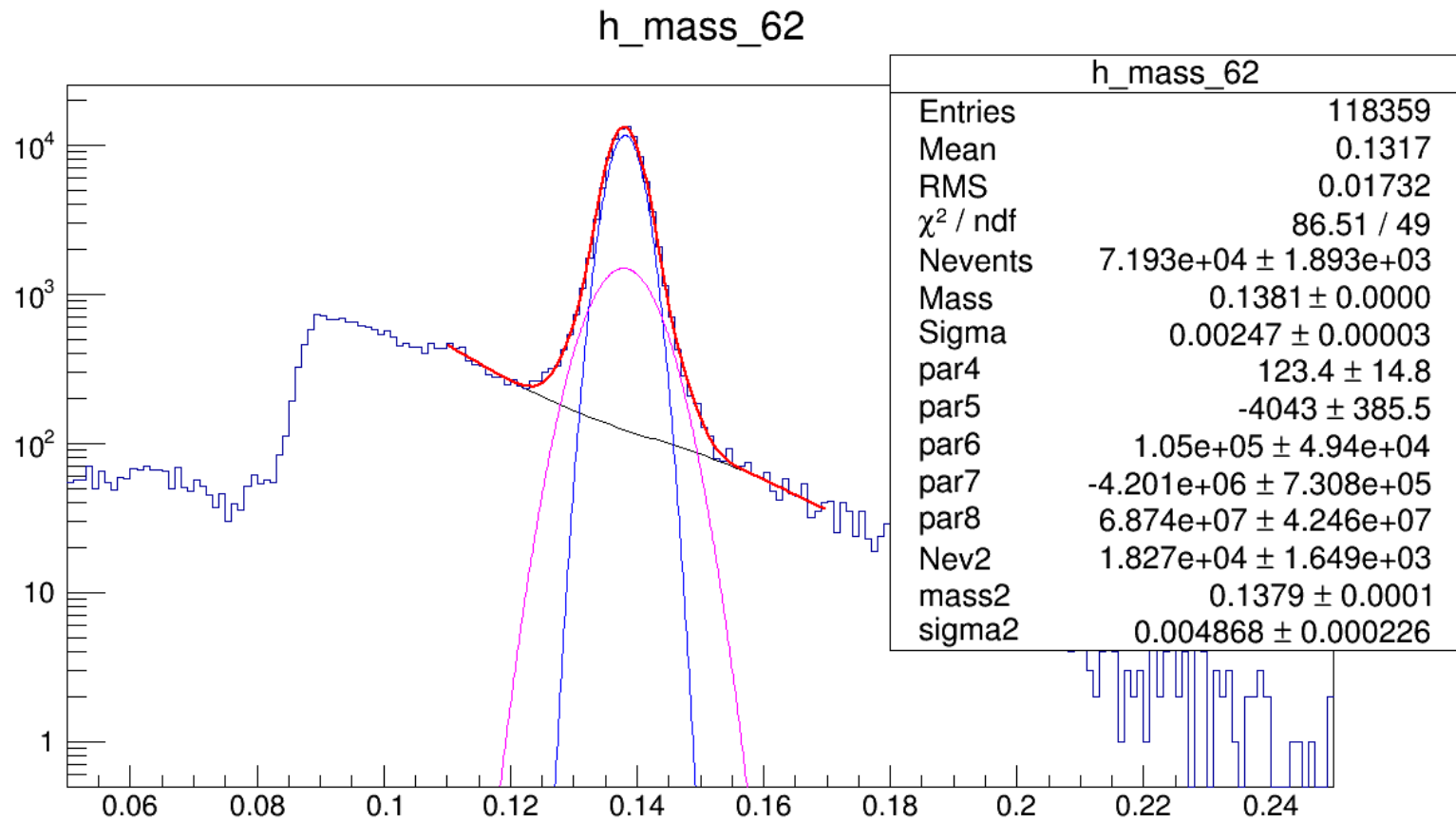
$|\text{tdiff}| < 20\text{ns}$ ,  $\text{elast} < 0.05$ ,  $\pm 10\text{ns}$  inside



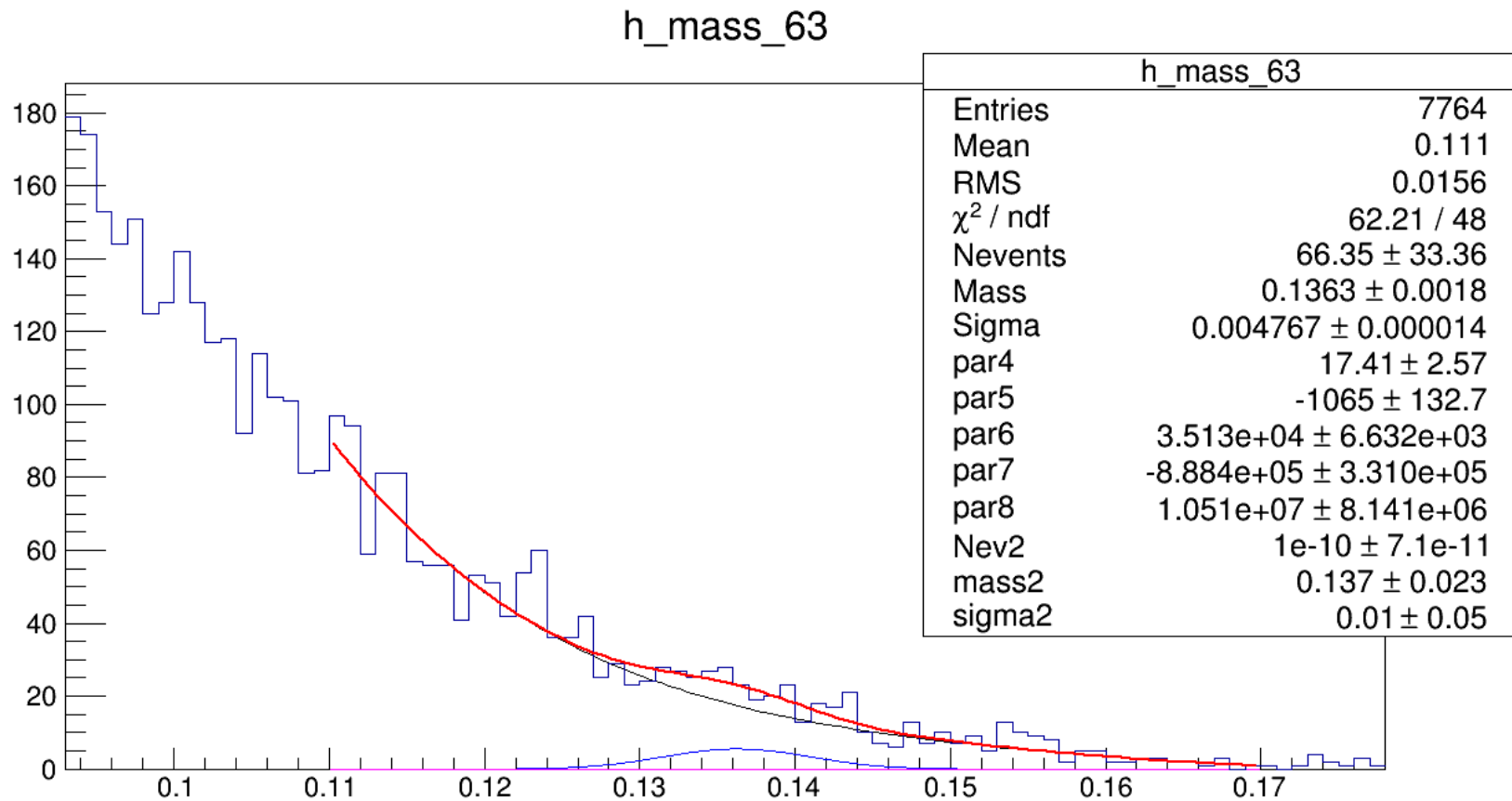
$|\text{tdiff}| < 20\text{ns}$ ,  $\text{elast} < 0.05$ , inside  $\pm 10\text{ns}$



# Tdiff+elast, +-20ns



# Tdiff+elast, +-20ns

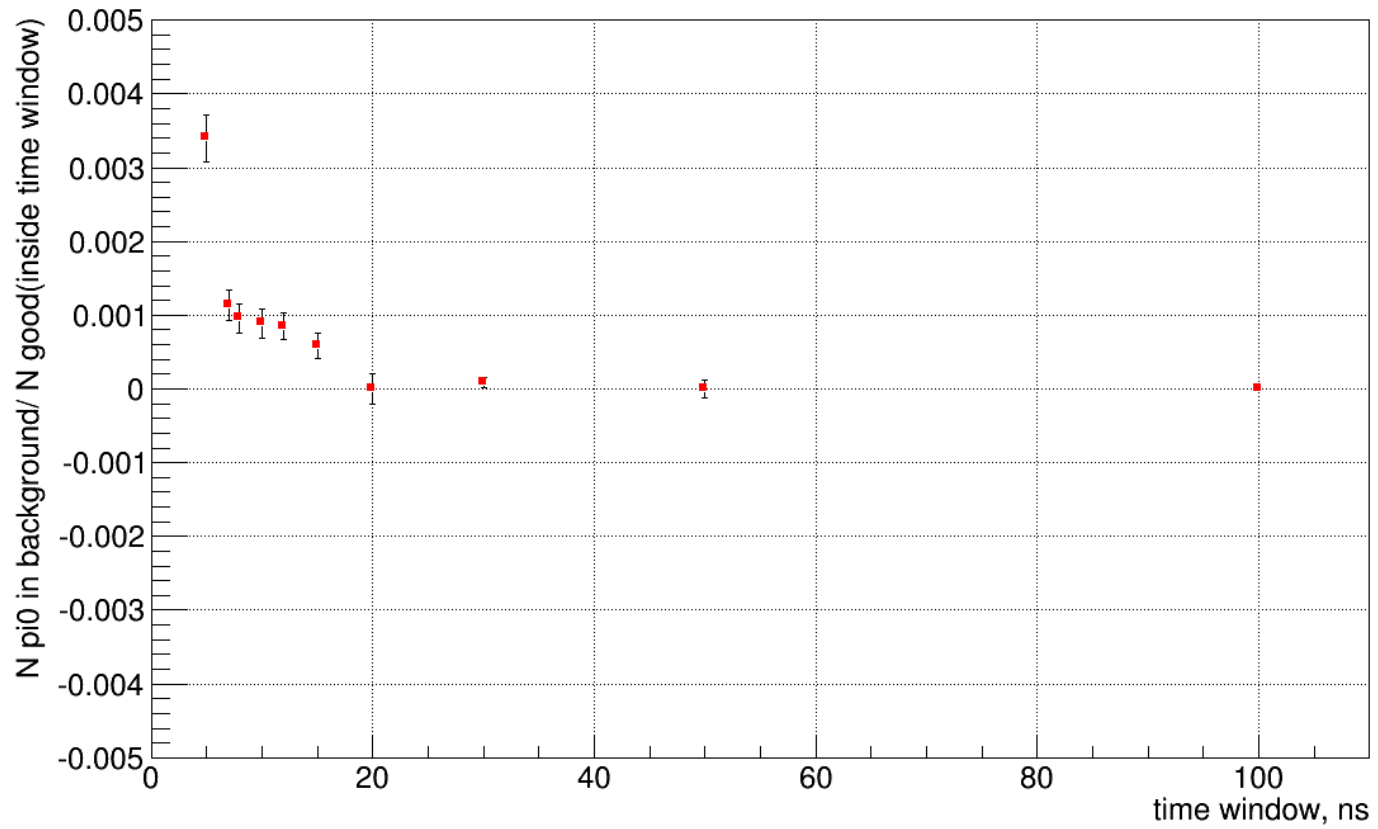


- Probability to lose  $\pi_0$  using time window cut
- Prob =  $N_1/N_0$

where  $N_1$  – number of  $\pi_0$  outside time wind

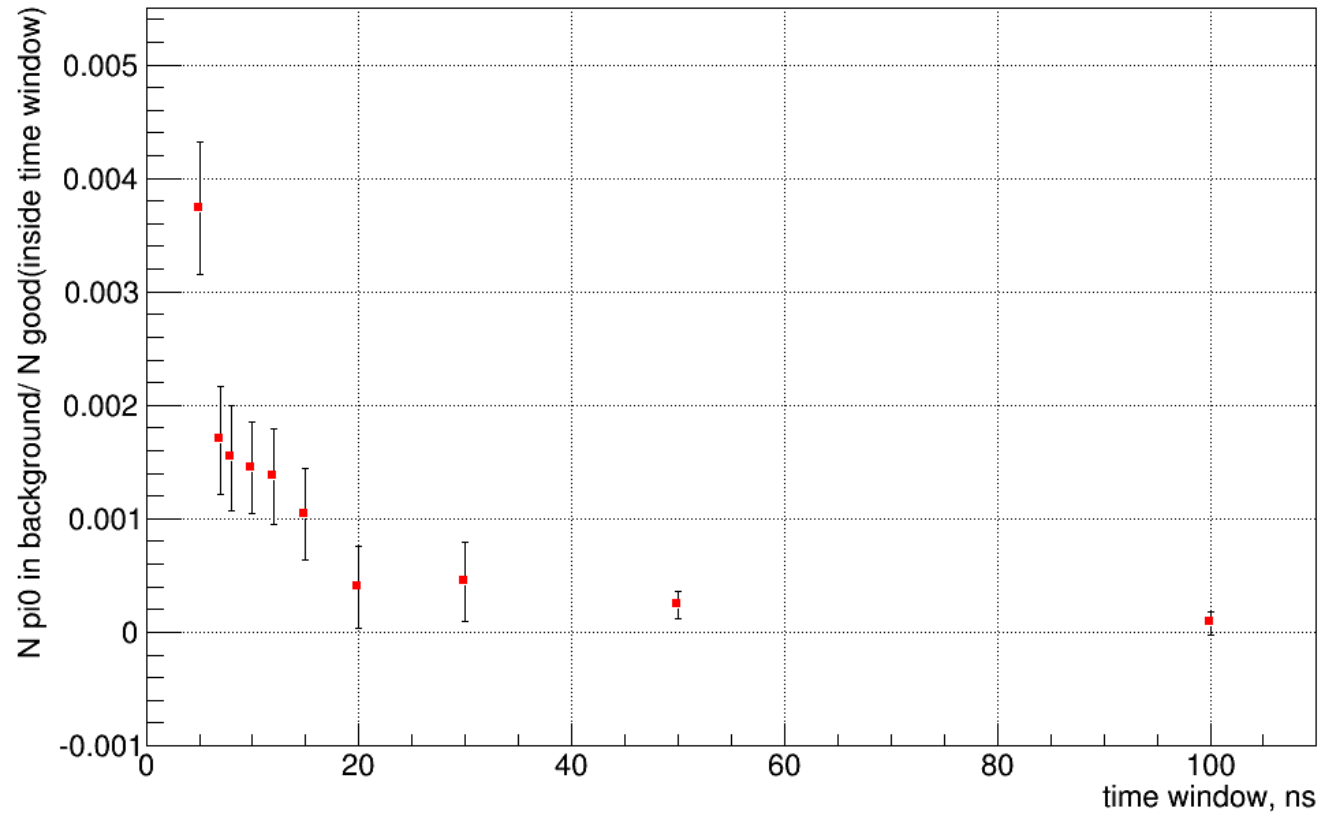
$N_0$  – number of  $\pi_0$  inside time window

# No cuts

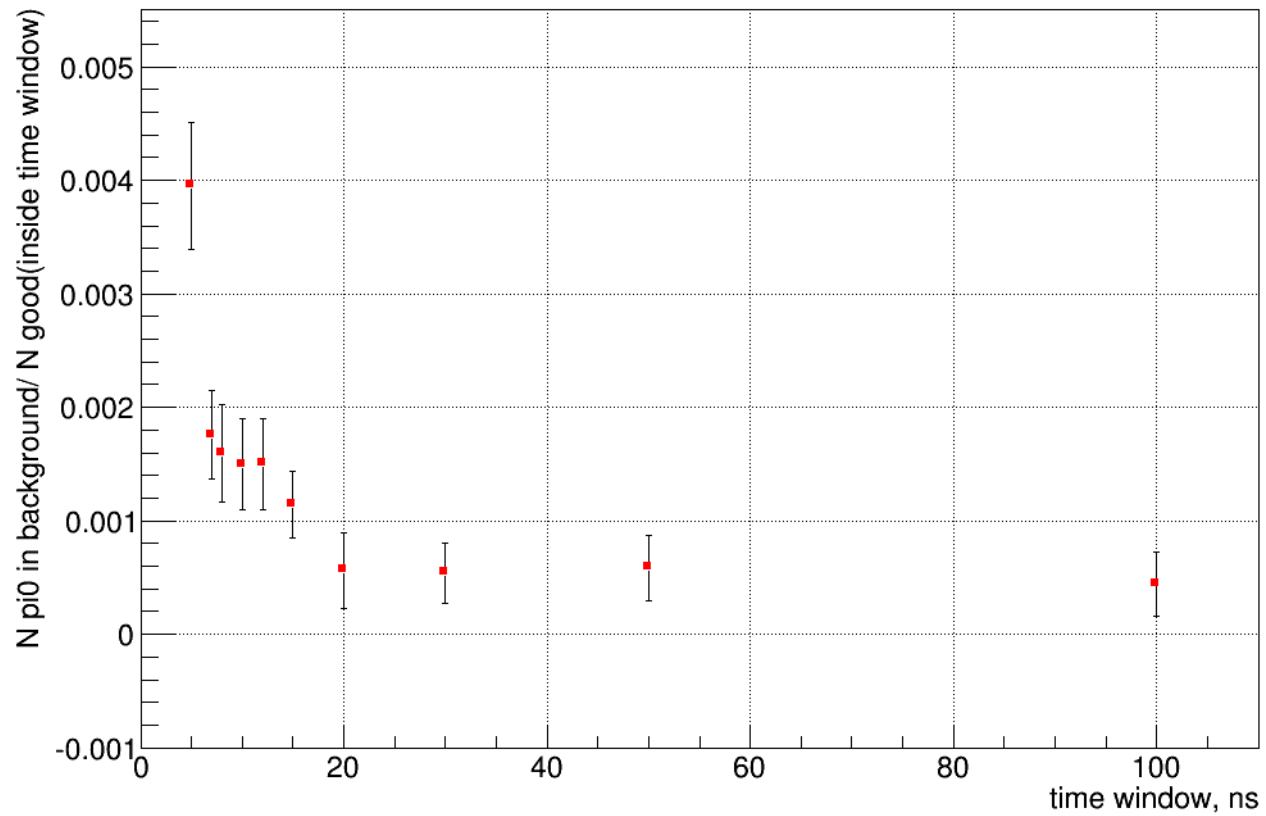




# $|t_{diff}| < 20\text{ns}$



$|t_{diff}| < 20\text{ns}$ ,  $\text{elast} < 0.05$



# Conclusion

- Probability to lose  $\pi^0$  using time window cut is about 0.4% when time window is  $\pm 5\text{ns}$ , and drops to zero when time window is  $\pm 20\text{ns}$ .