

Simulazione Contrasto

Edge Spread Function (ESF)

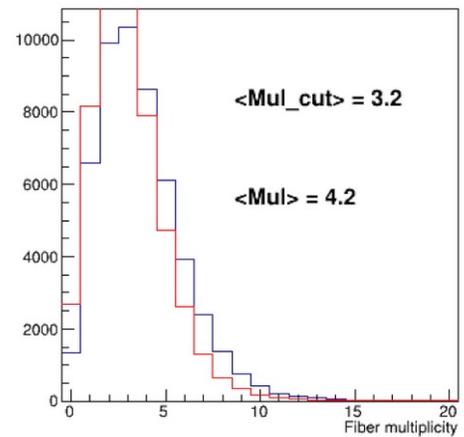
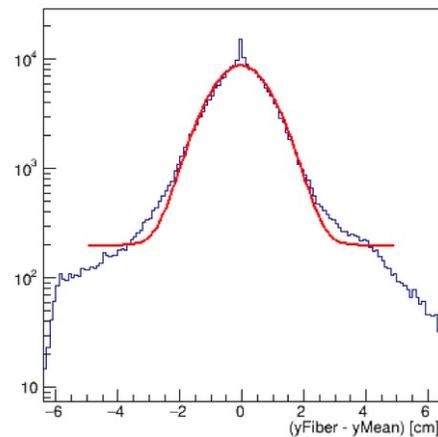
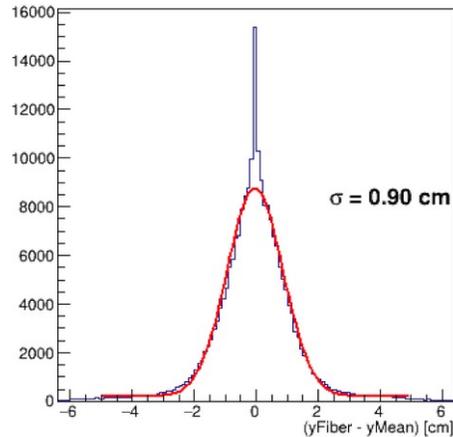
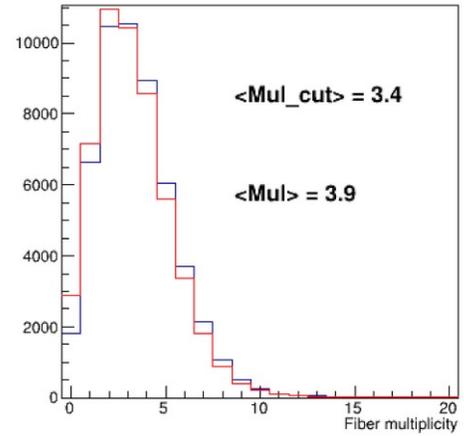
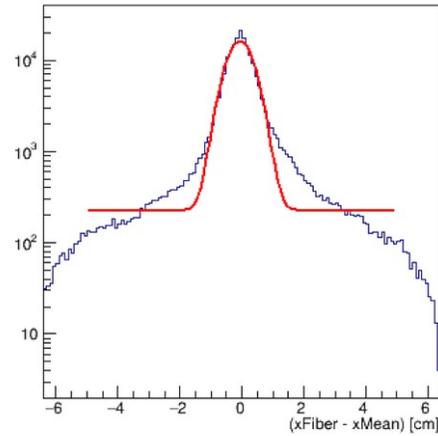
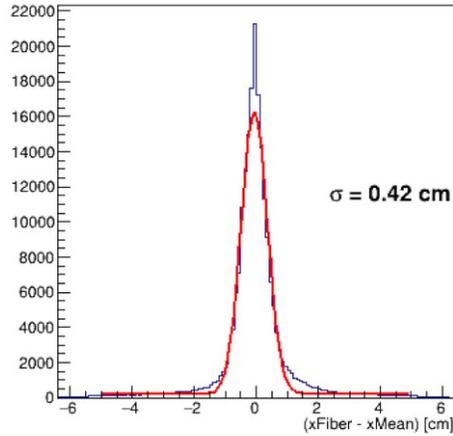
Sono stati simulati i run in cui variava lo spessore della slab di aria

E_{beam} nominale: 228.57 MeV

Gap: 10 mm, 5 mm, 4 mm, 3 mm, 2 mm

Indice Run:	#eventi > di:	Energia Macchina [MeV]	Misure per:	Descrizione	NOTA BENE:
7	750000	228,57	Contrasto/ESF	Fantoccio 14 cm + slab d'aria al centro di (0.50 +/- 0.02) cm	7 cm RW3 + 0.5 cm aria + 7 cm RW3
8	700000	228,57	Contrasto/ESF	Fantoccio 14.3 cm + slab d'aria (0.20 +/- 0.02) cm	7 cm RW3 + 0.2 cm aria + 7.3 cm RW3
9	750000	228,57	Contrasto/ESF	Fantoccio 14.2 cm + slab d'aria (0.30 +/- 0.02) cm	7 cm RW3 + 0.3 cm aria + 7.2 cm RW3
10	700000	228,57	Contrasto/ESF	Fantoccio 14.1 cm + slab d'aria (0.40 +/- 0.02) cm	7 cm RW3 + 0.4 cm aria + 7.1 cm RW3
11	750000	228,57	Contrasto/ESF	Fantoccio 13.5 cm + slab d'aria (1.00 +/- 0.02) cm	7 cm RW3 + 1 cm aria + 6.5 cm RW3

E = 227 MeV



Per ogni larghezza di gap, sono stati considerati diversi valori del parametro di smearing della coordinata X misurata con il tracciatore a fibre.

Una prima valutazione ottenuta dai dati sperimentali indica che lo smearing poteva essere realisticamente compreso fra 2 e ~ 4.5 mm

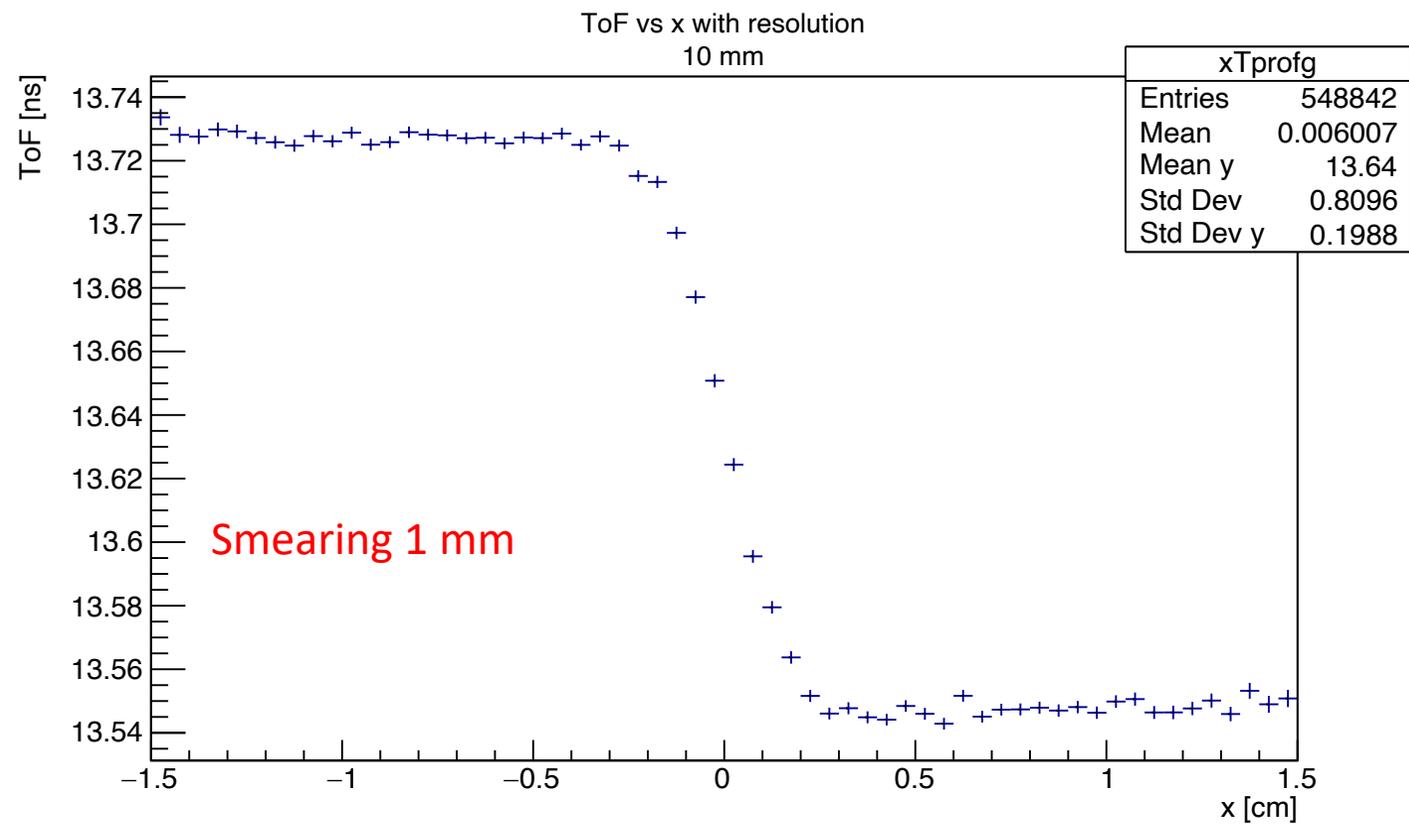
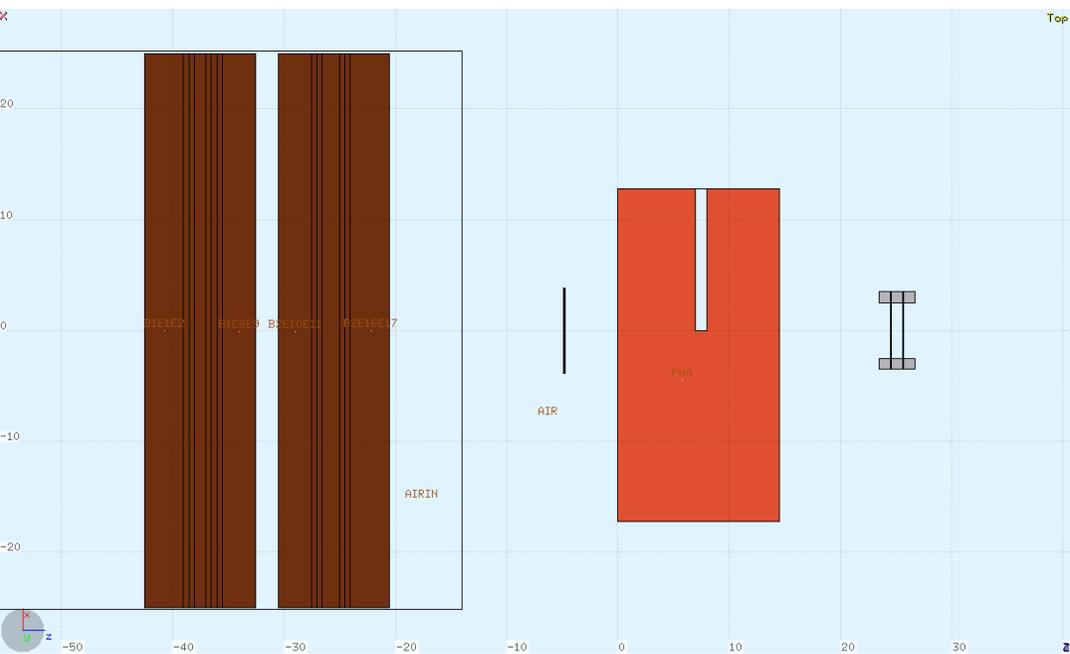
Smearing assunto (per ora) in modo approssimato come gaussiano
(parametro di smearing = RMS della gaussiana):
2,3,4 e 5 mm

Analisi:

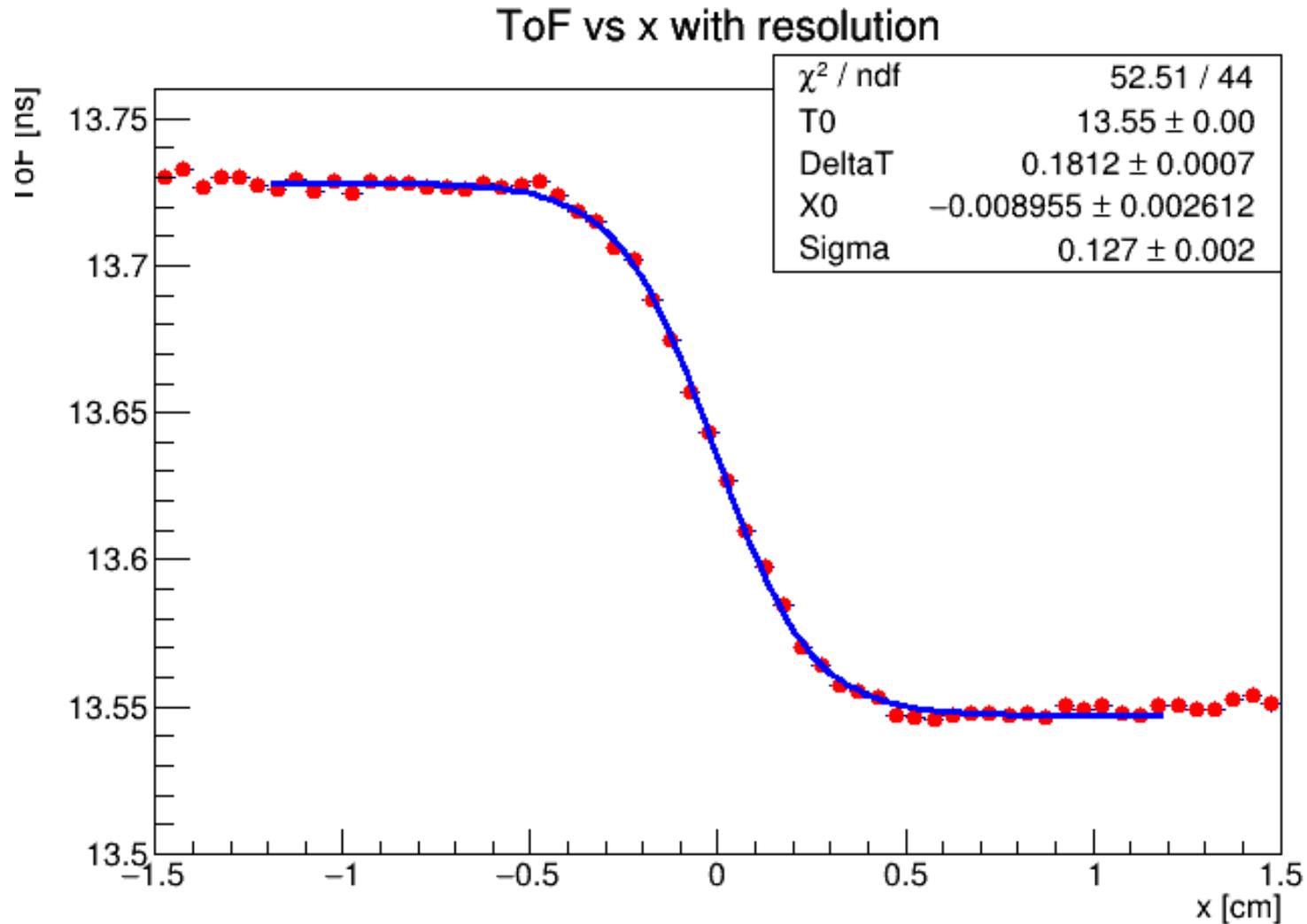
fit del profilo ToF vs X con la ESF:

$$f(x) = t_0 + \Delta t \left(\frac{1}{1 + e^{\frac{x-x_0}{\sigma}}} \right)$$

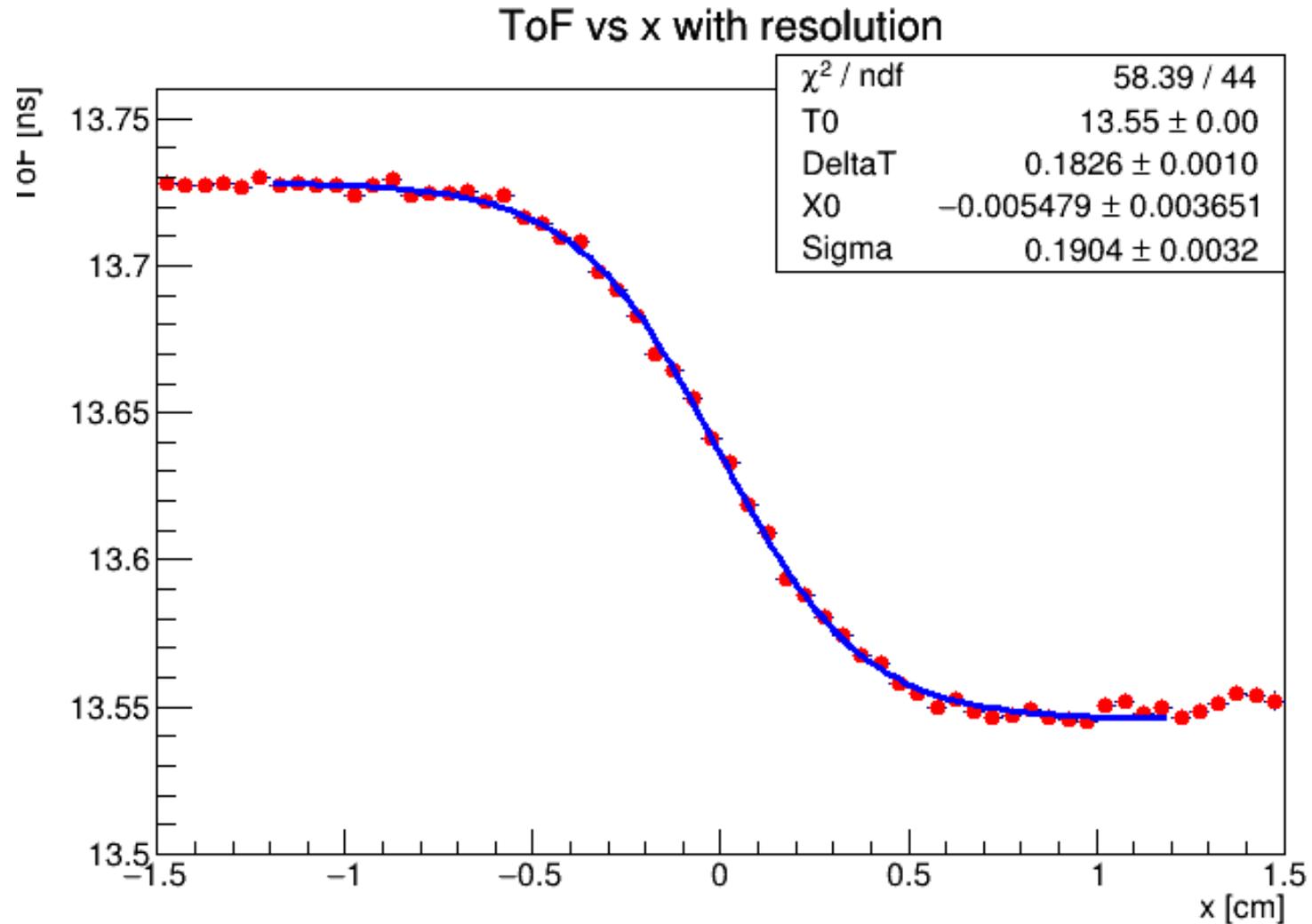
Gap 10 mm



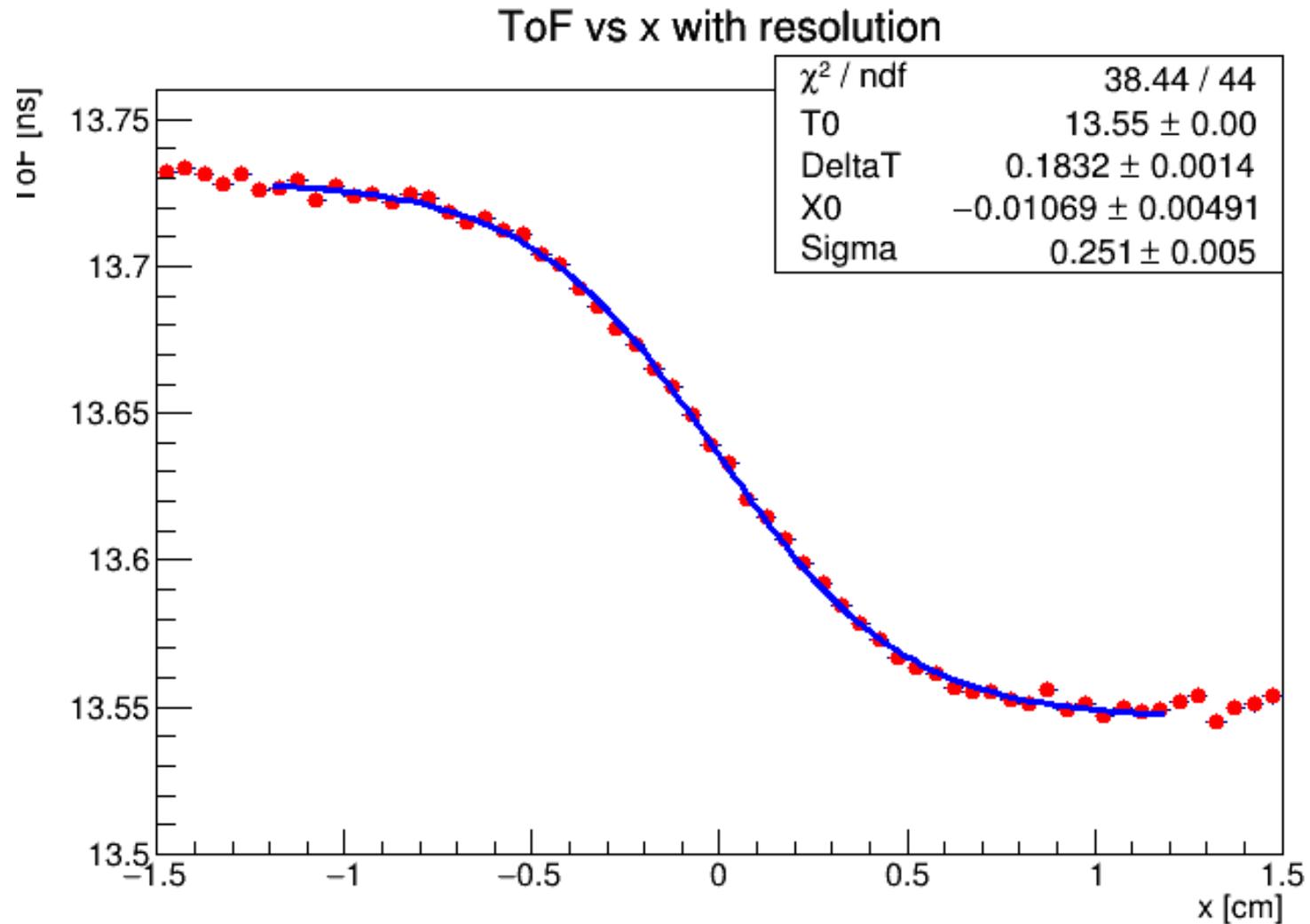
Gap 10mm - smearing 2mm



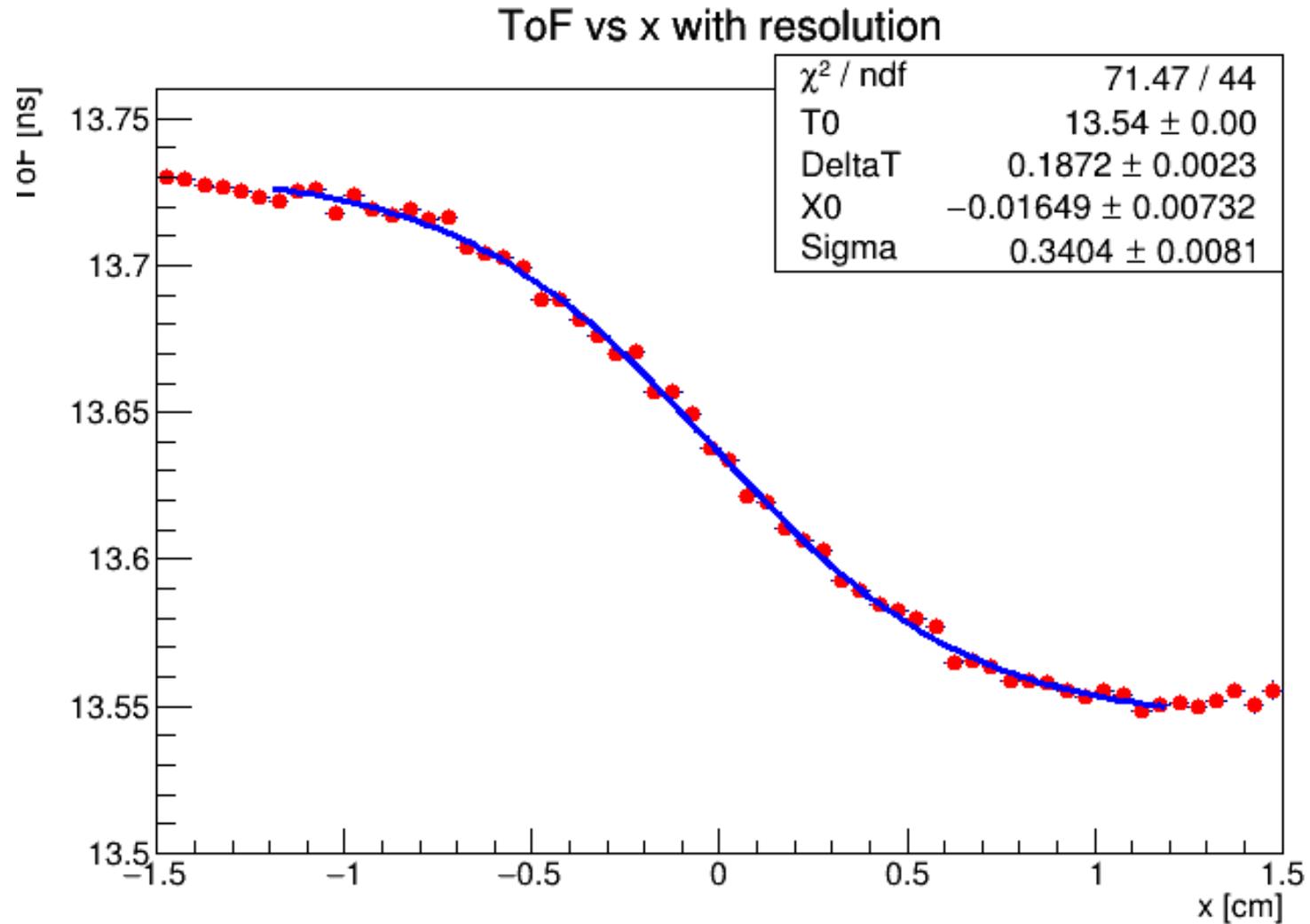
Gap 10mm - smearing 3mm



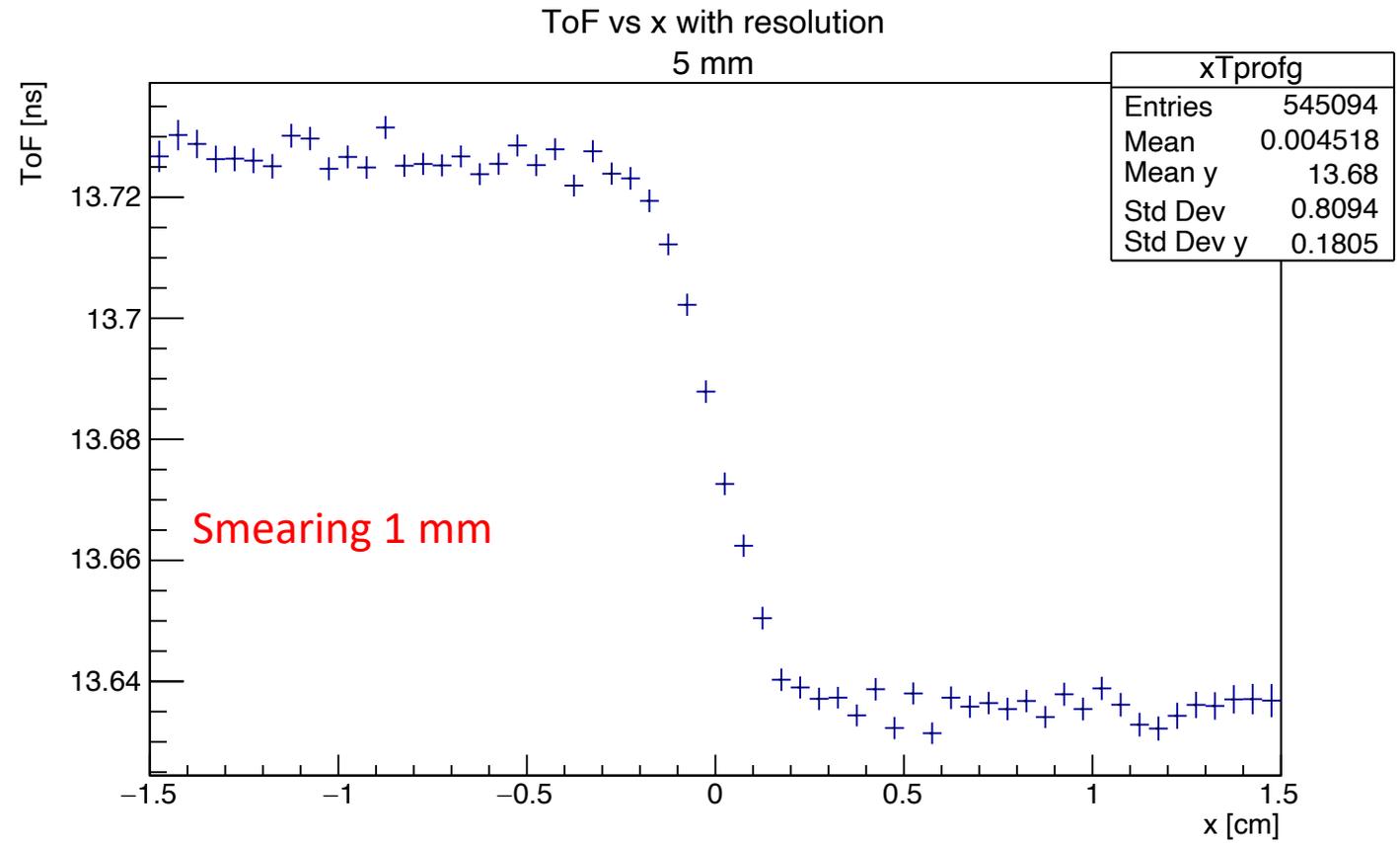
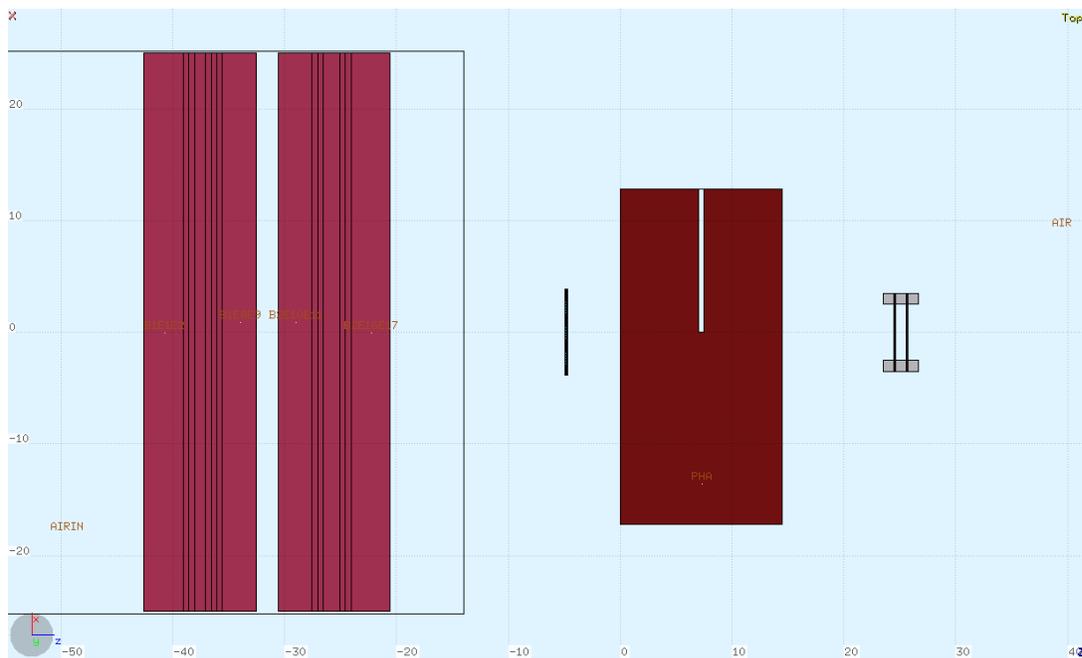
Gap 10mm - smearing 4mm



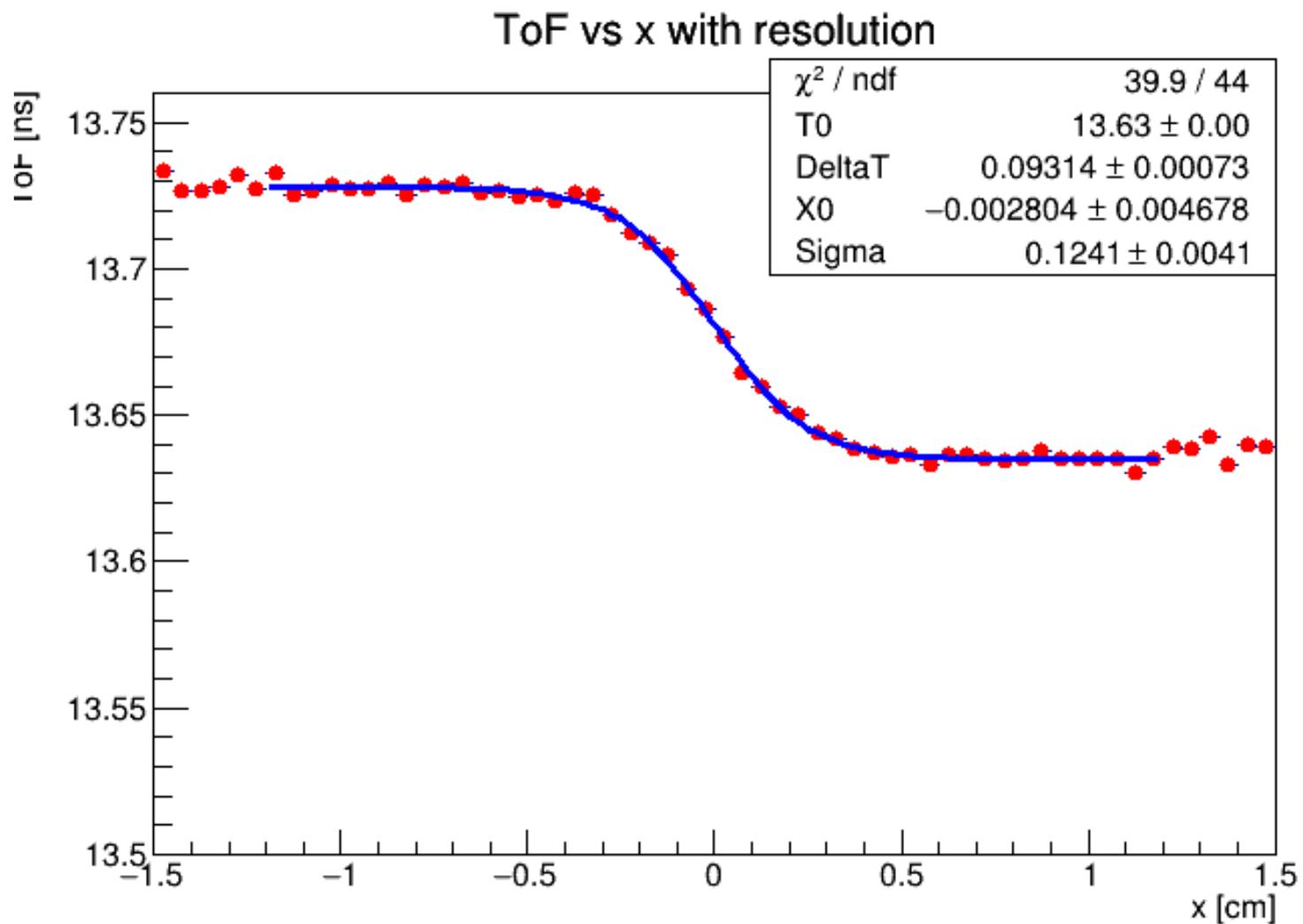
Gap 10mm - smearing 5mm



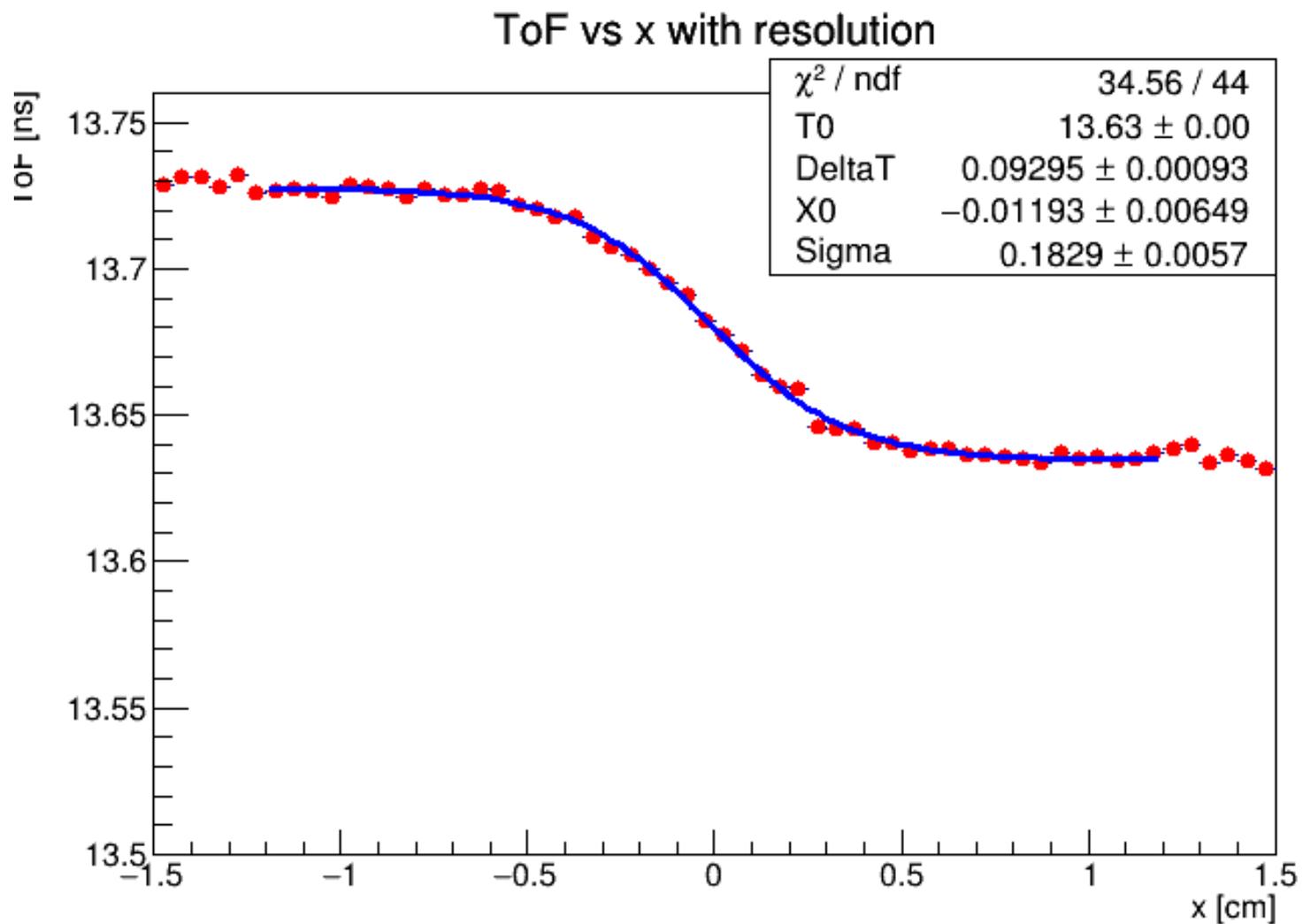
Gap 5 mm



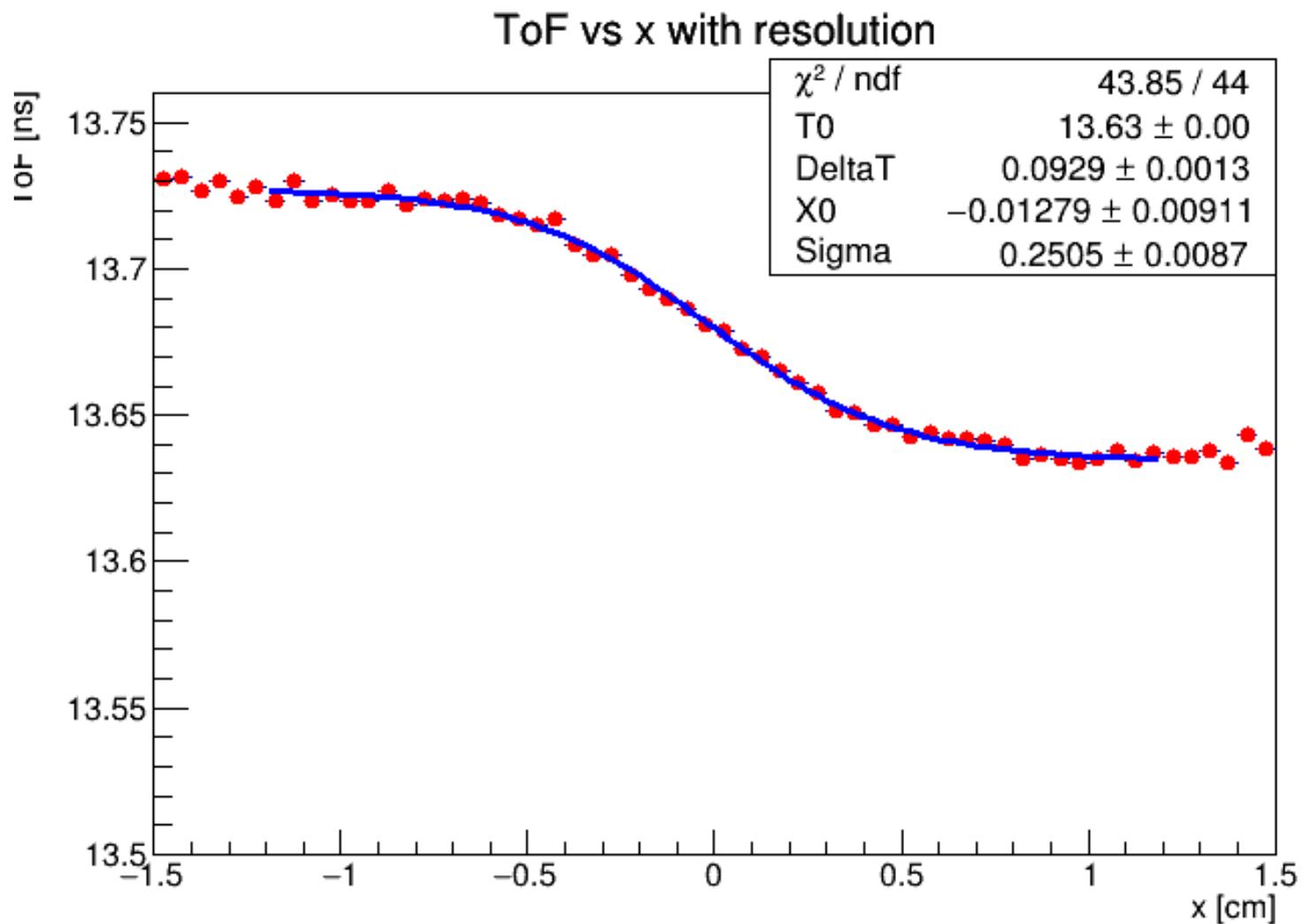
Gap 5mm - smearing 2mm



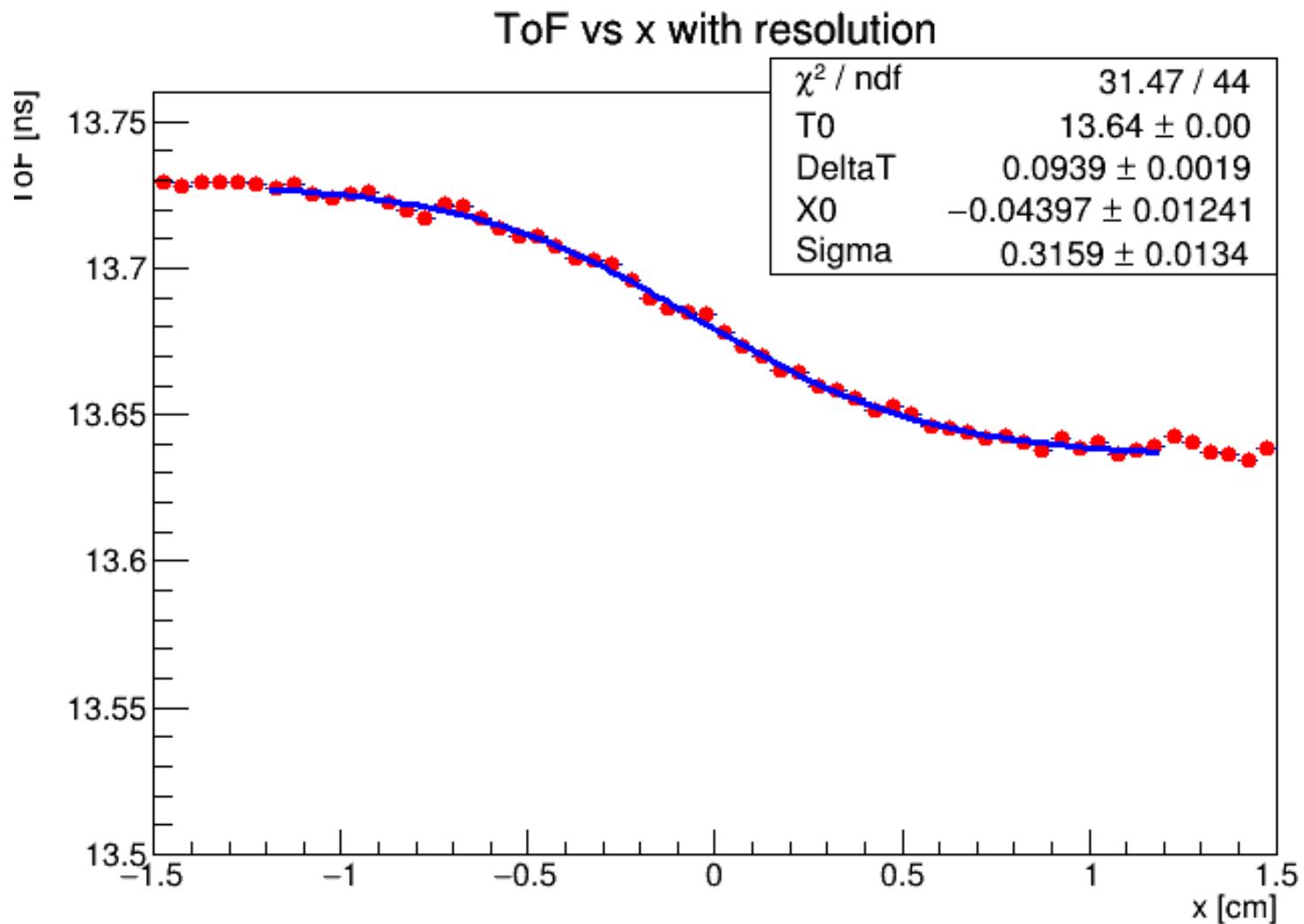
Gap 5mm - smearing 3mm



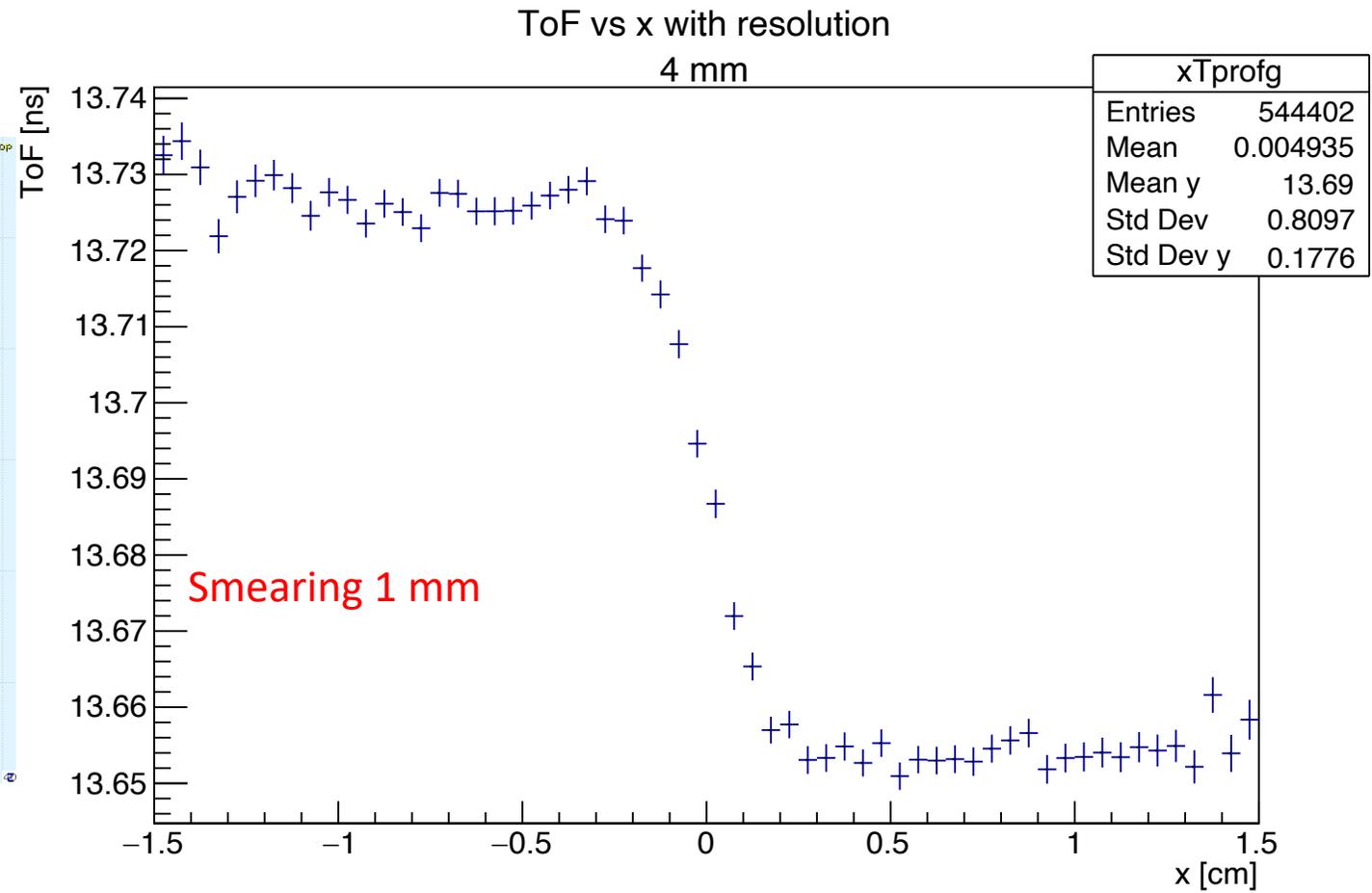
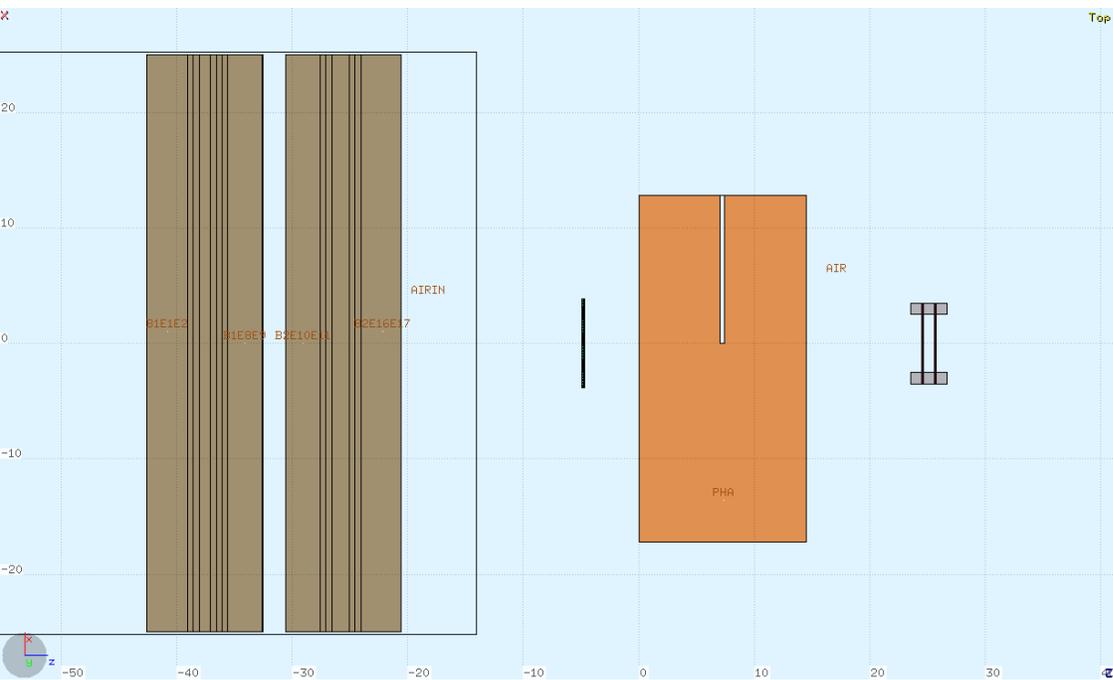
Gap 5mm - smearing 4mm



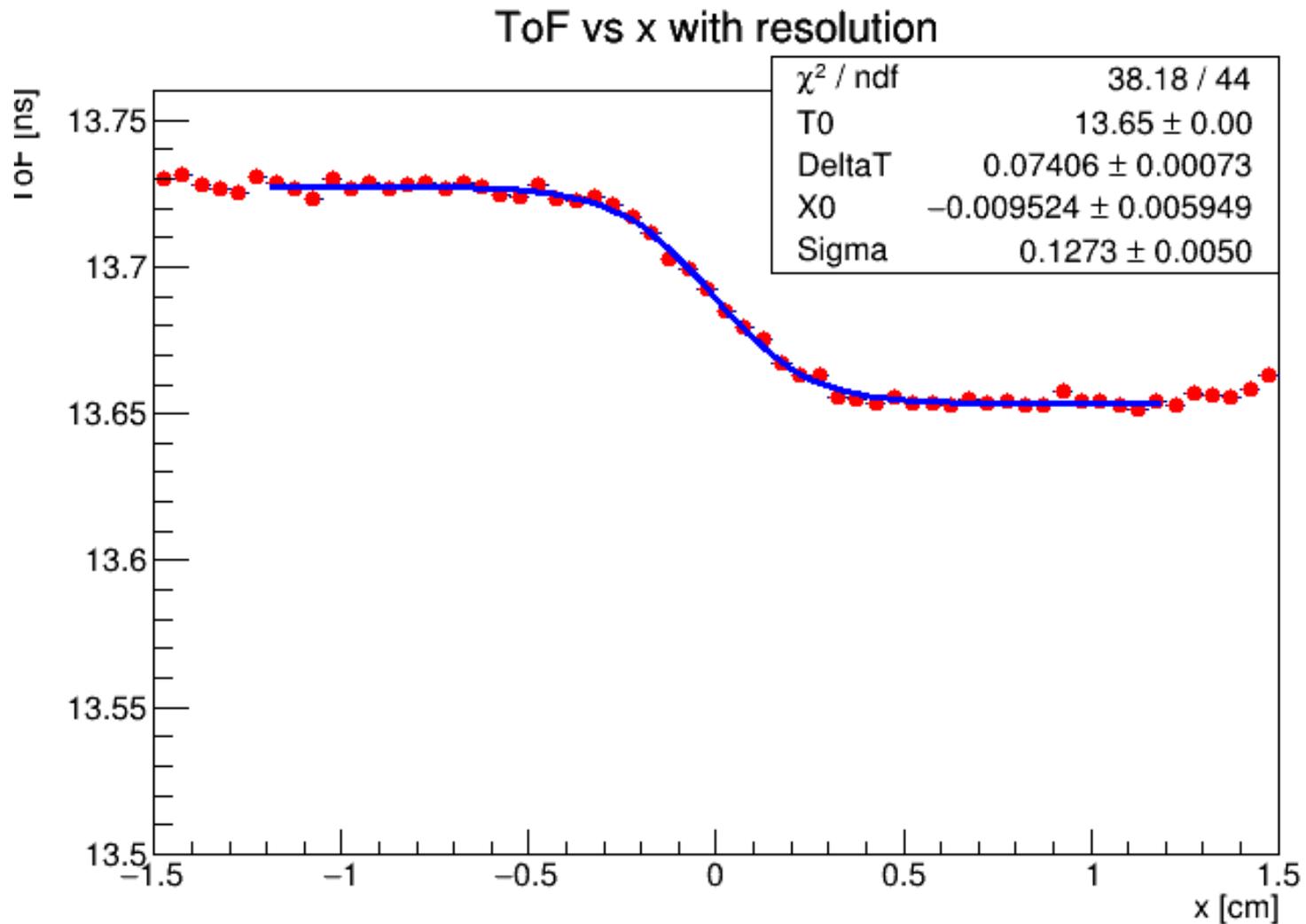
Gap 5mm - smearing 5mm



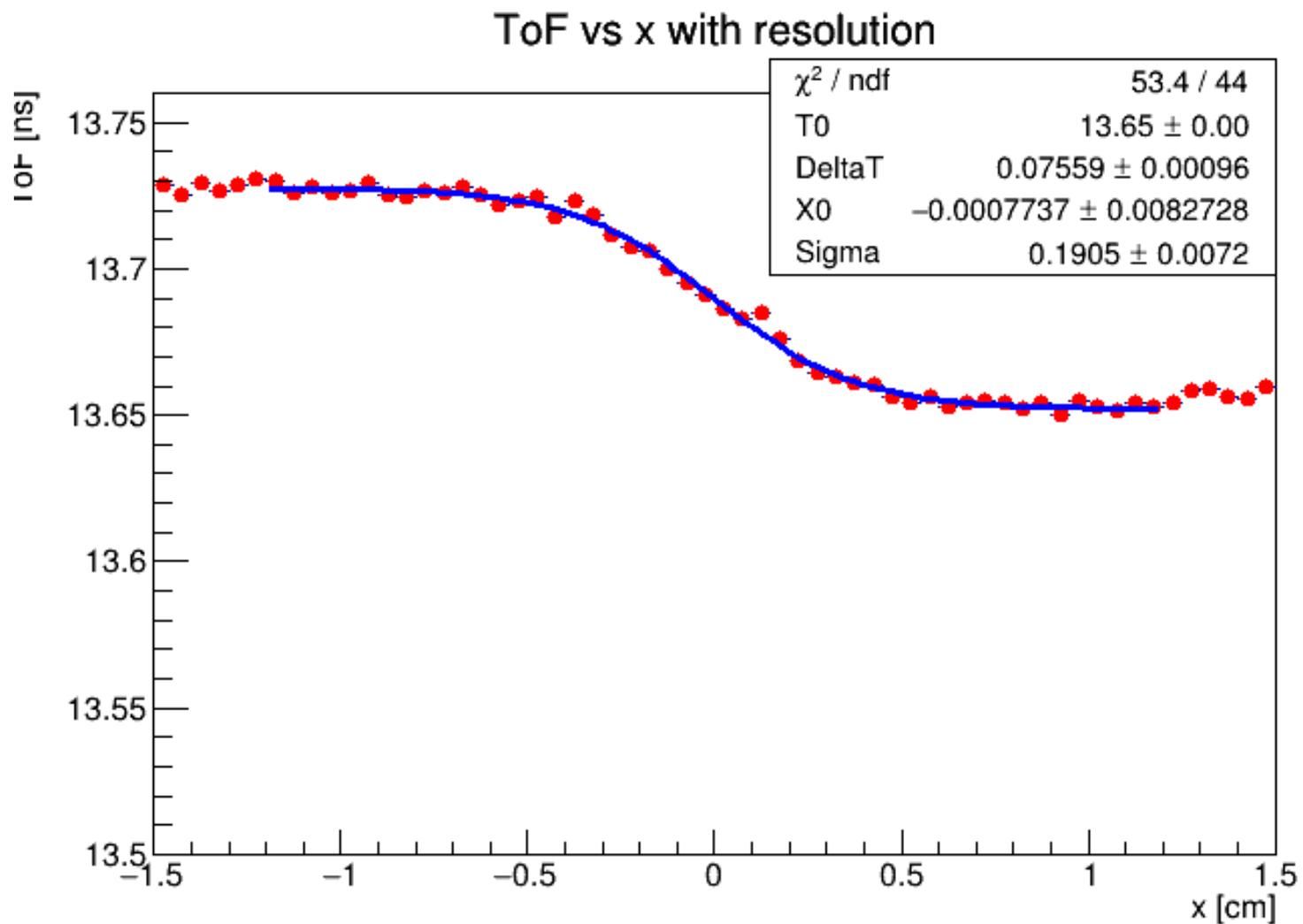
Gap 4 mm



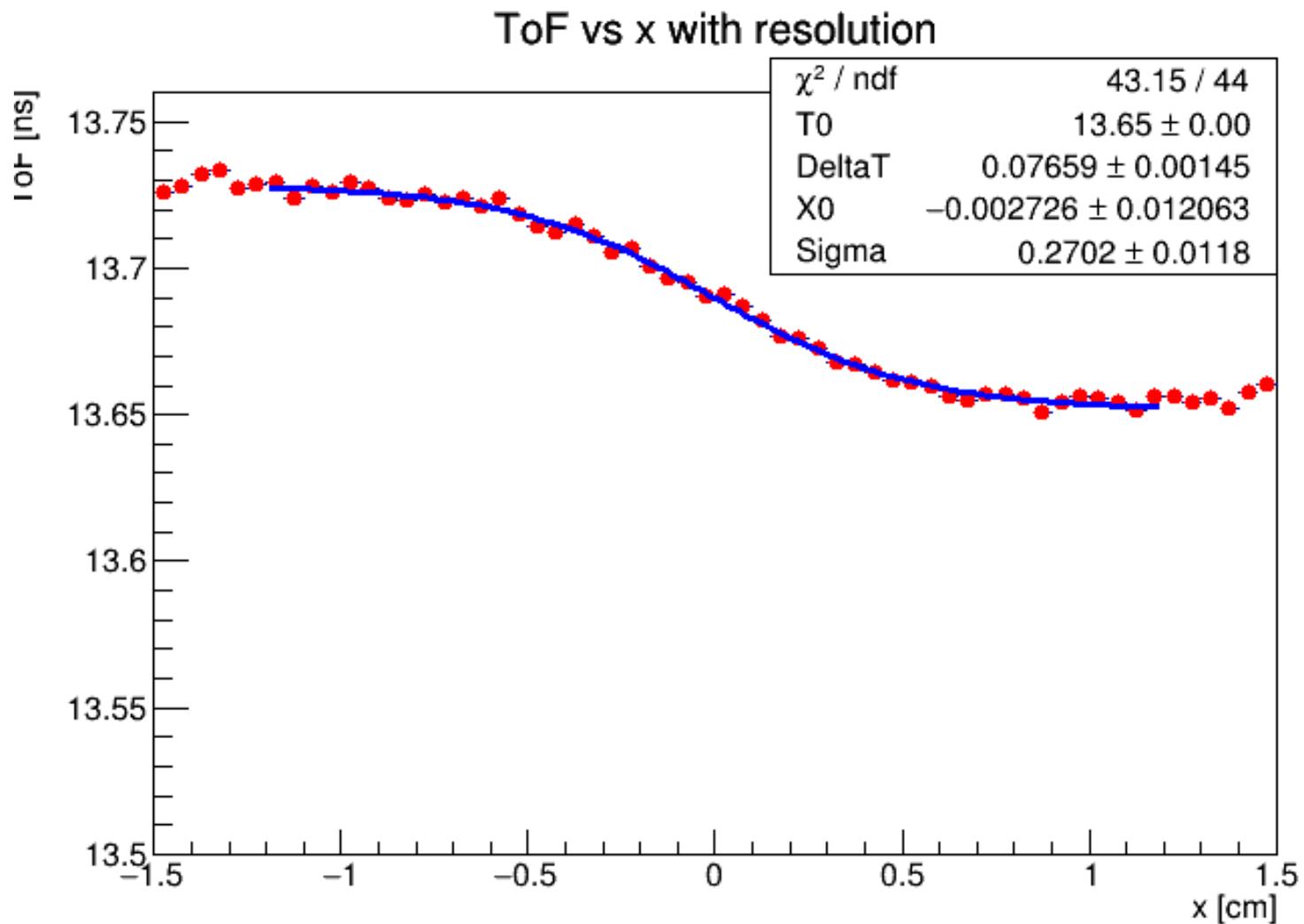
Gap 4mm - smearing 2mm



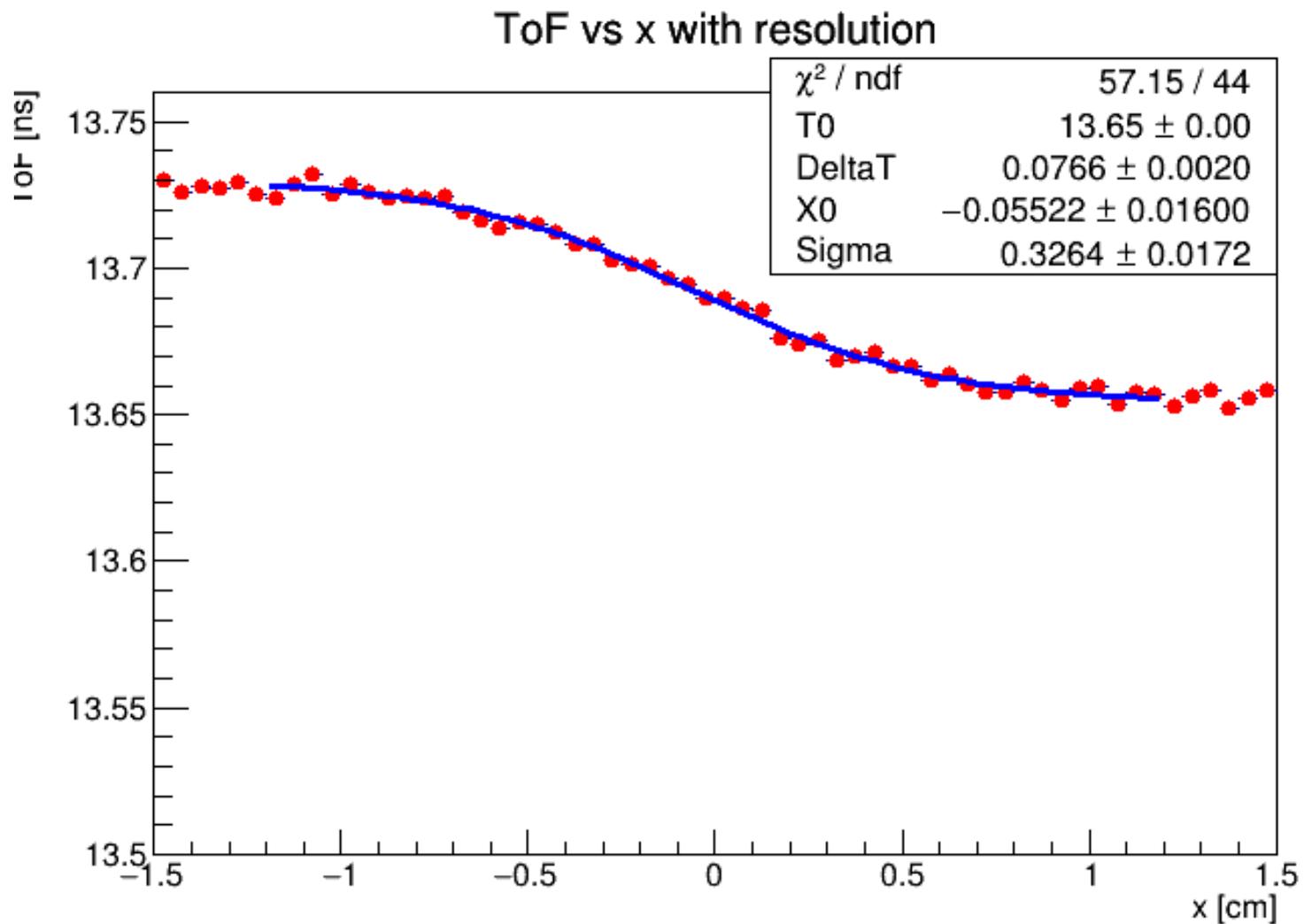
Gap 4mm - smearing 3mm



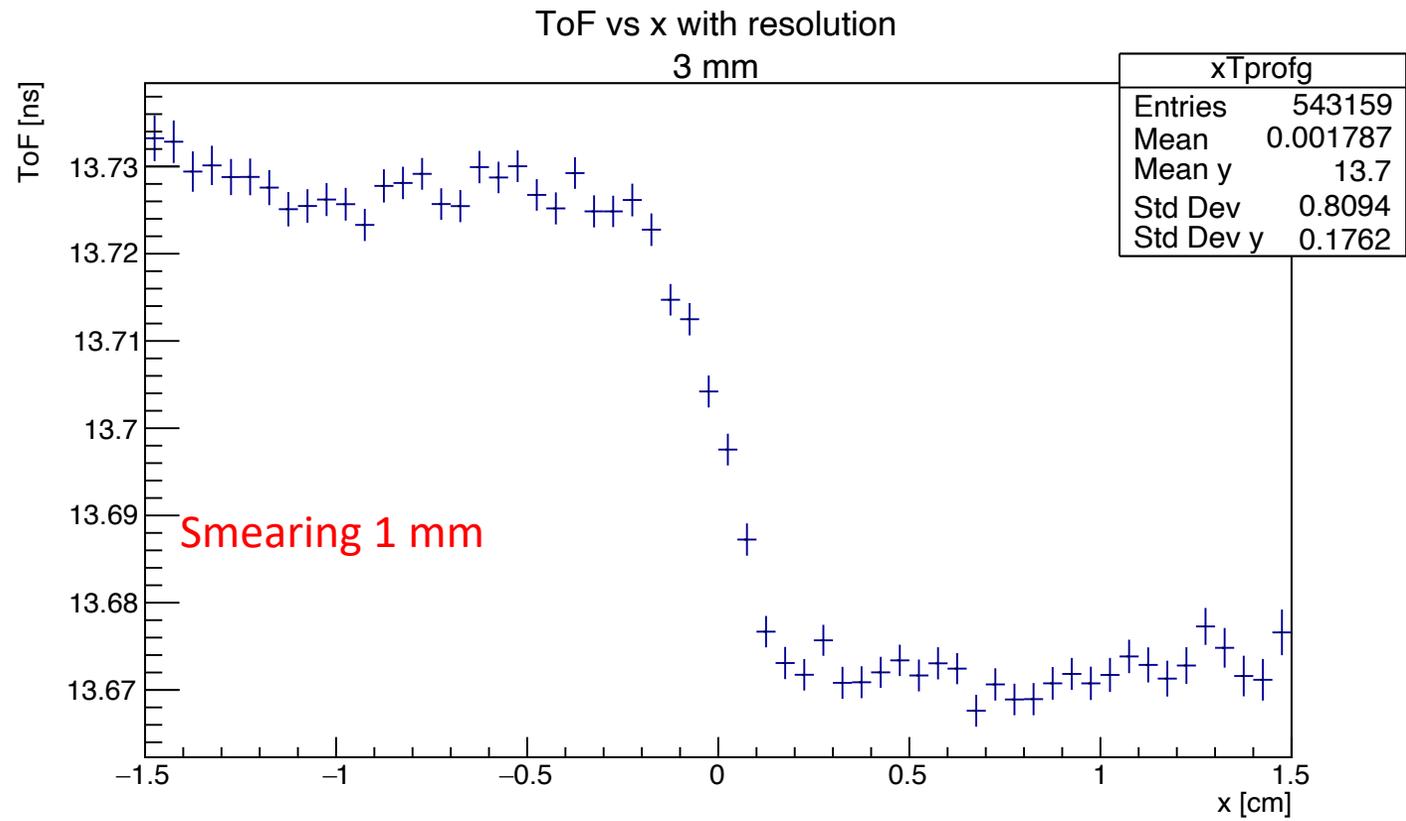
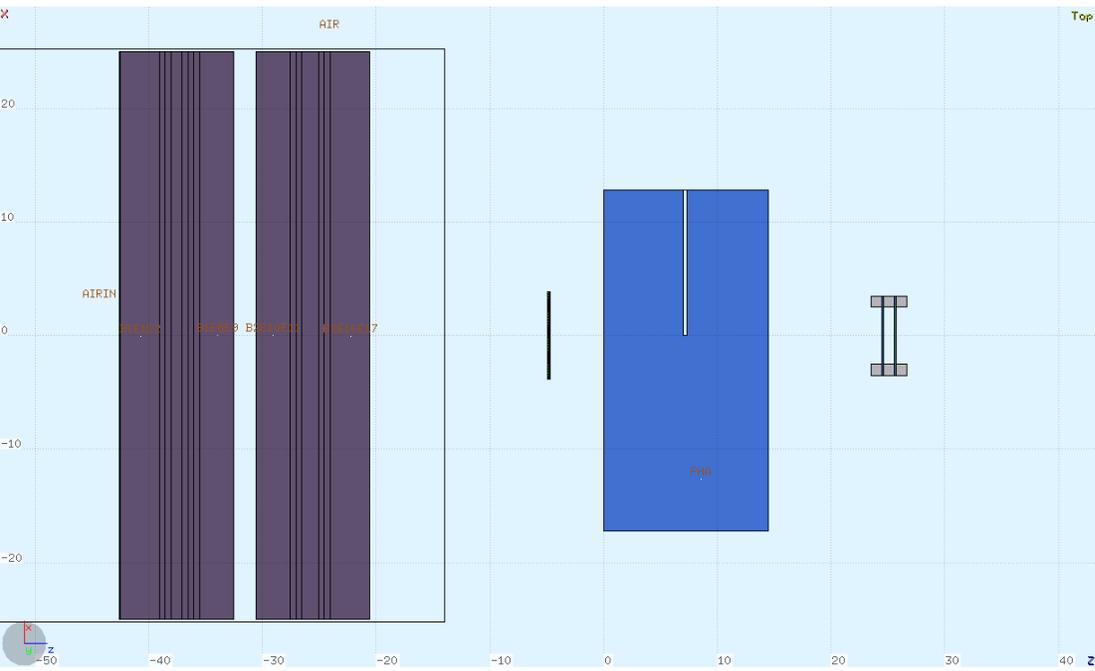
Gap 4mm - smearing 4mm



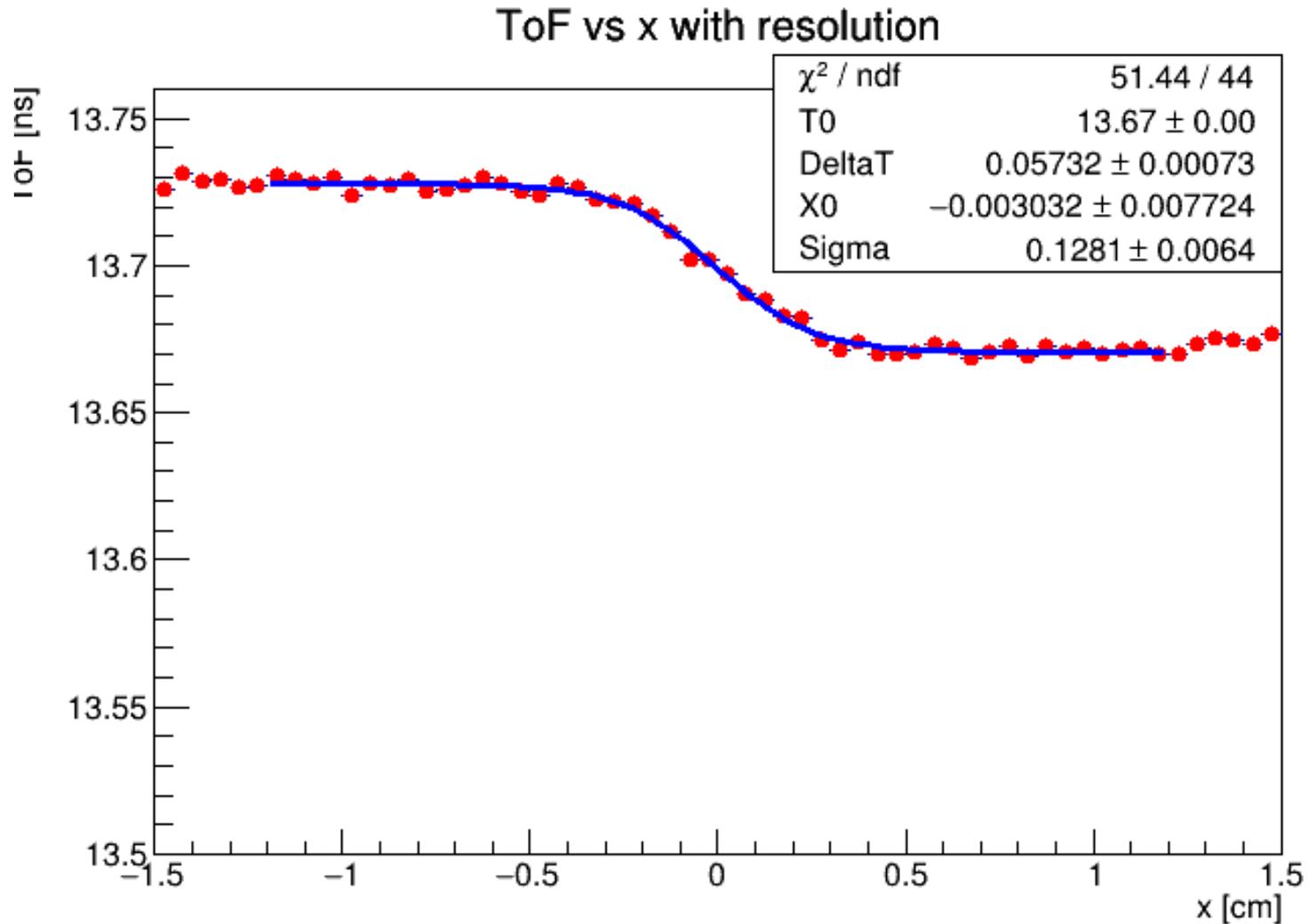
Gap 4mm - smearing 5mm



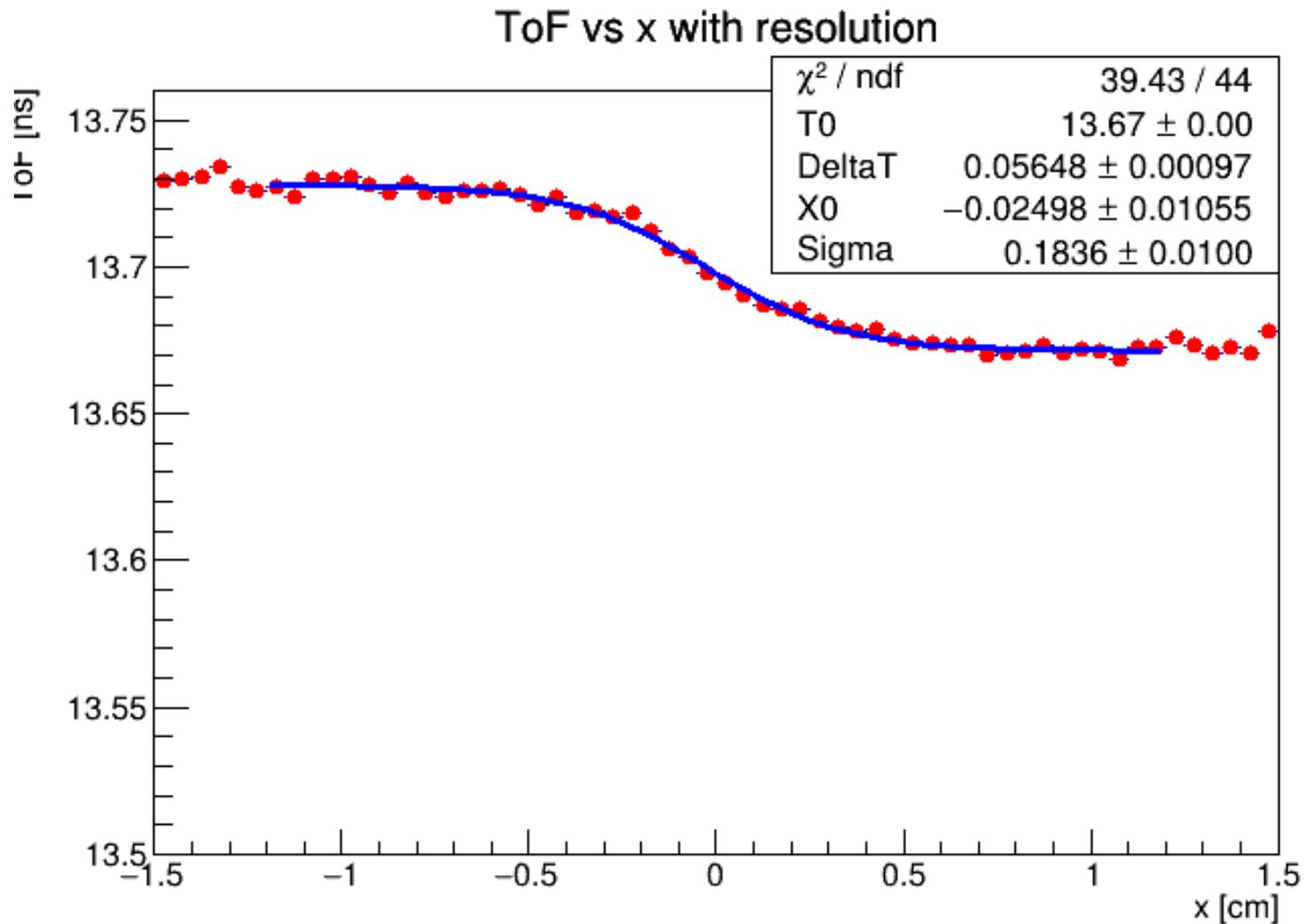
Gap 3 mm



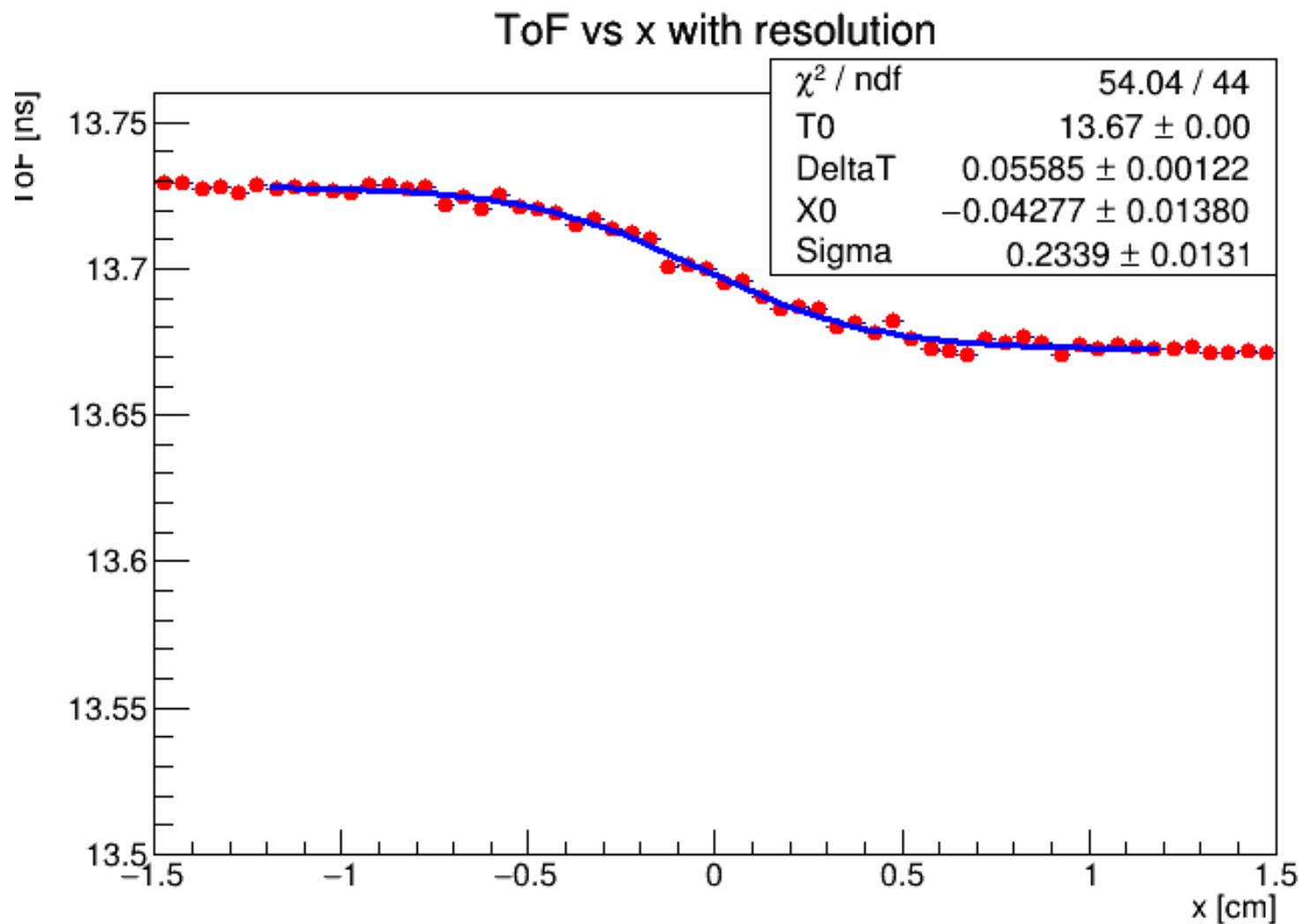
Gap 3mm - smearing 2mm



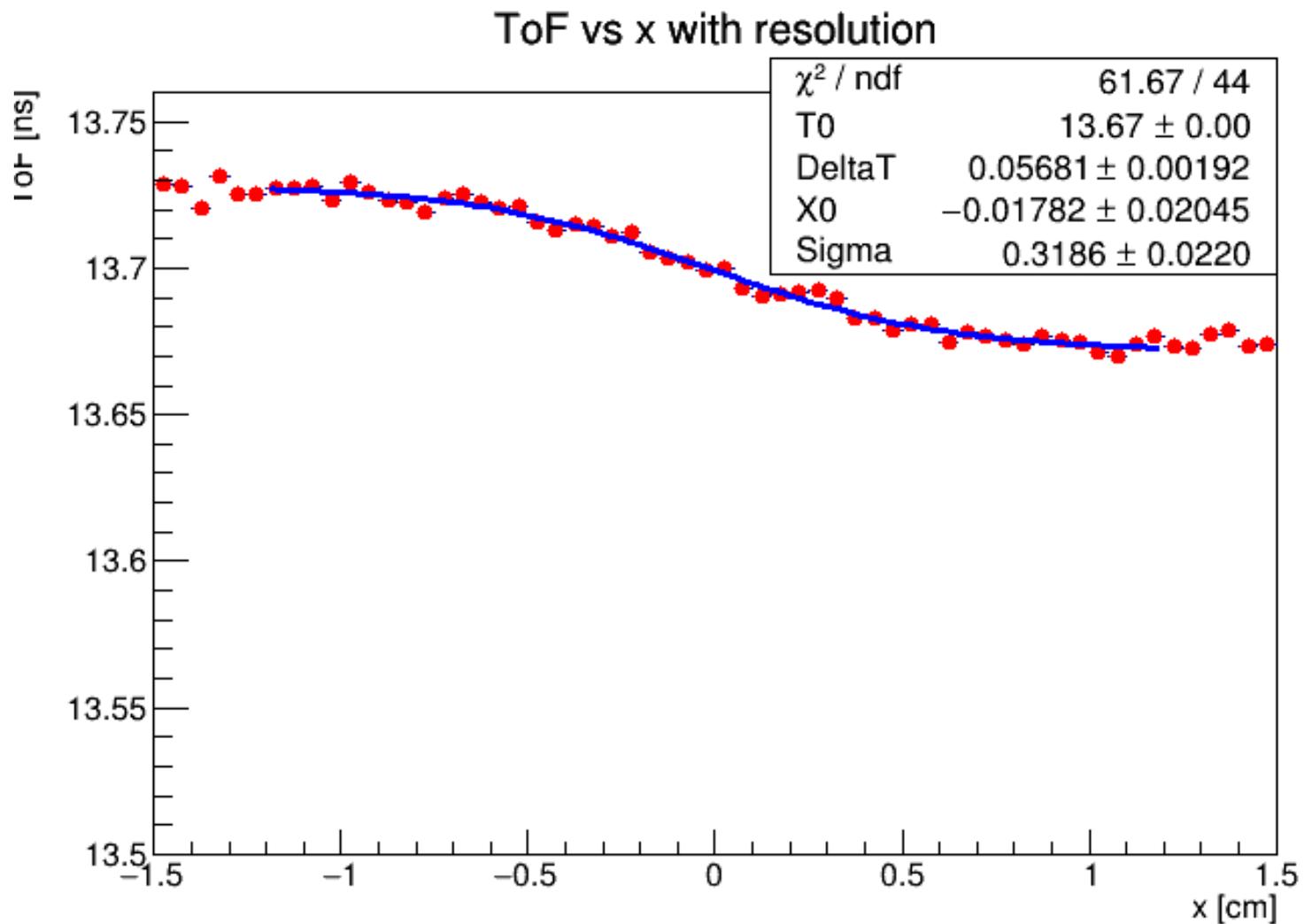
Gap 3mm - smearing 3mm



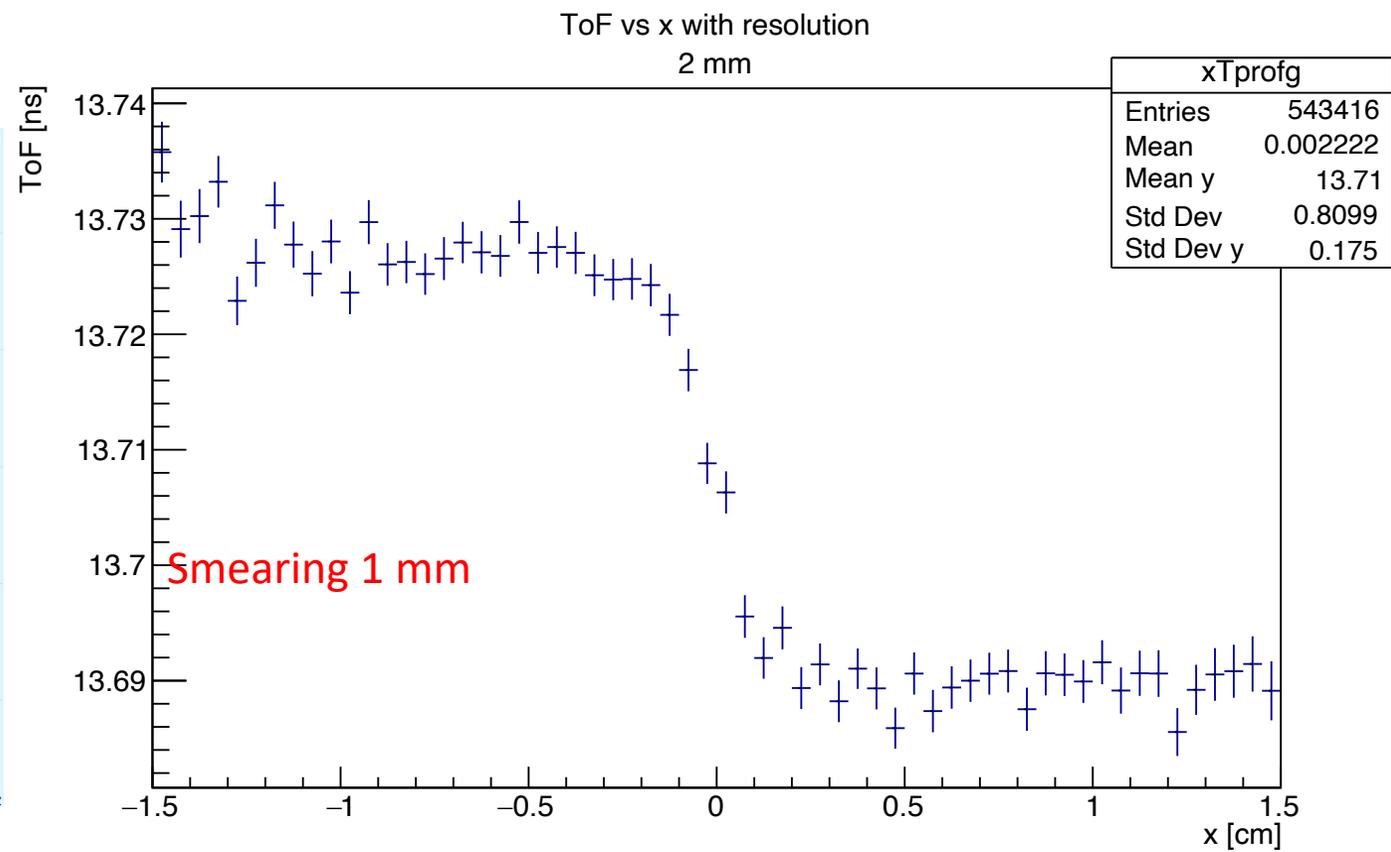
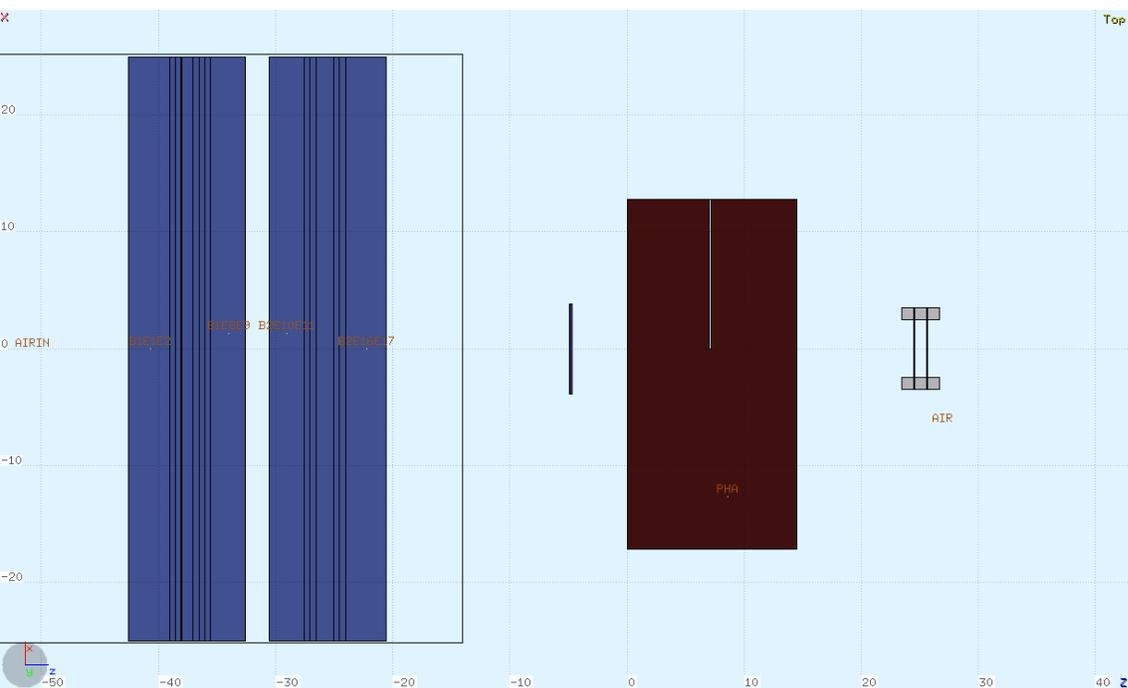
Gap 3mm - smearing 4mm



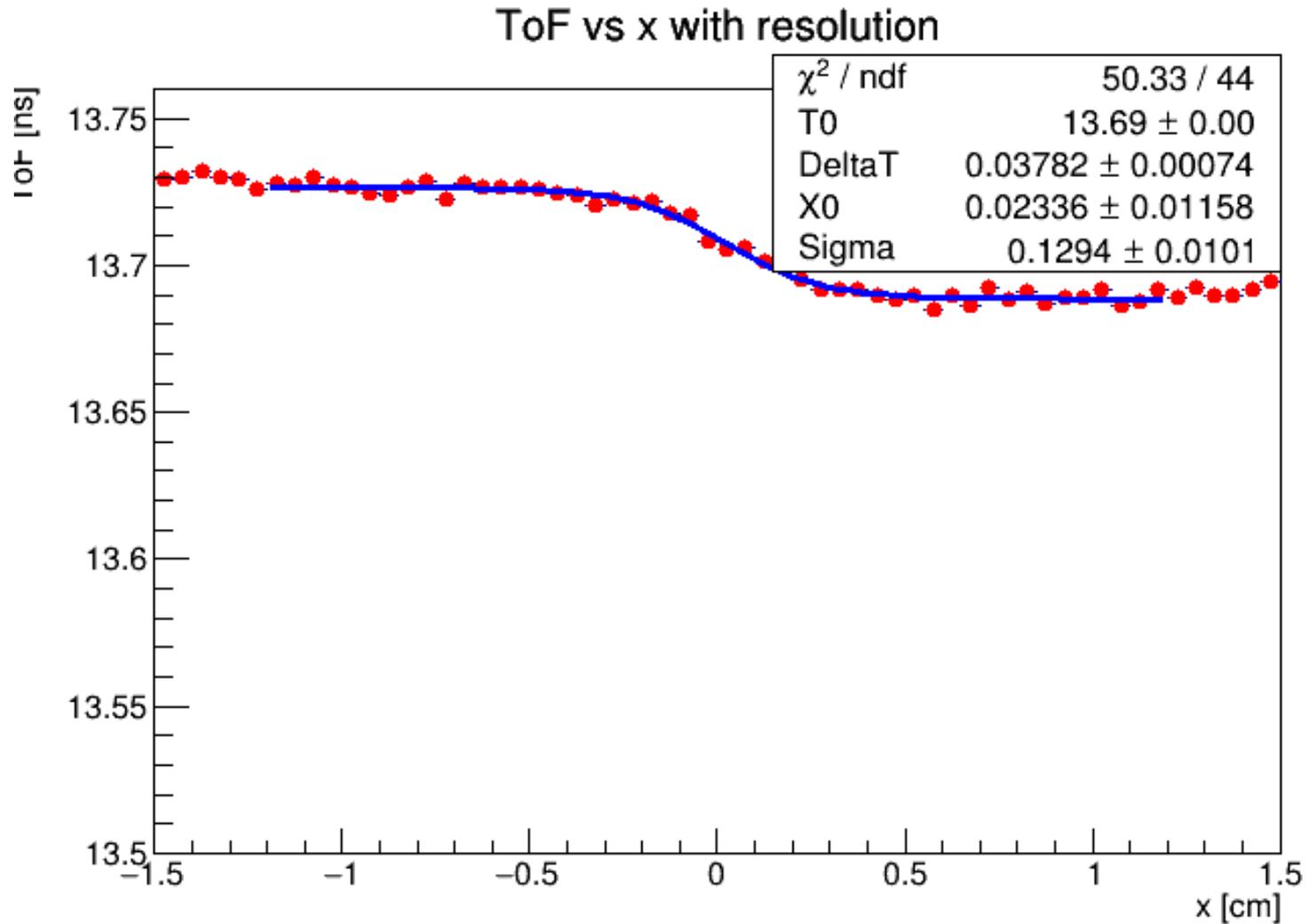
Gap 3mm - smearing 5mm



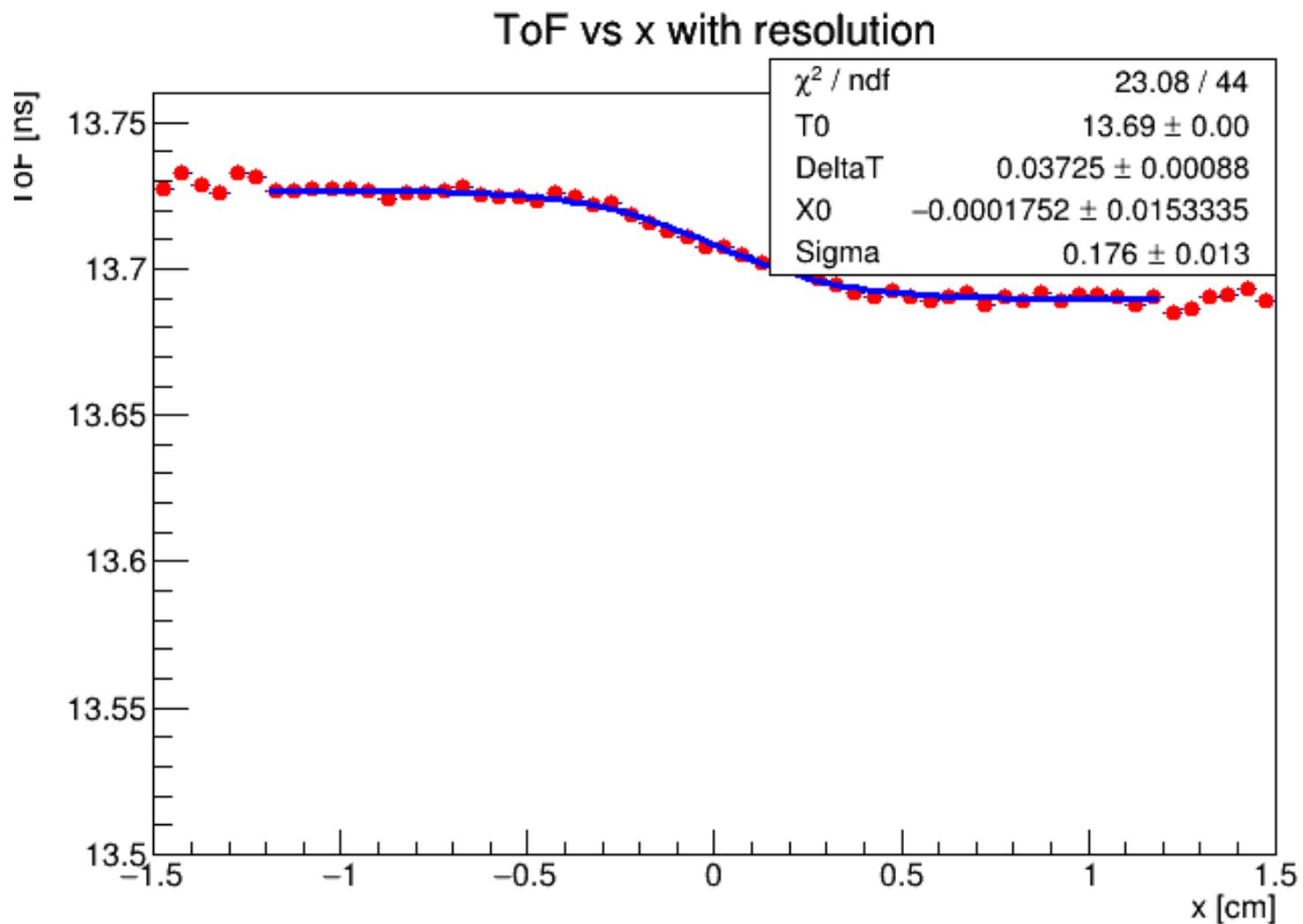
Gap 2 mm



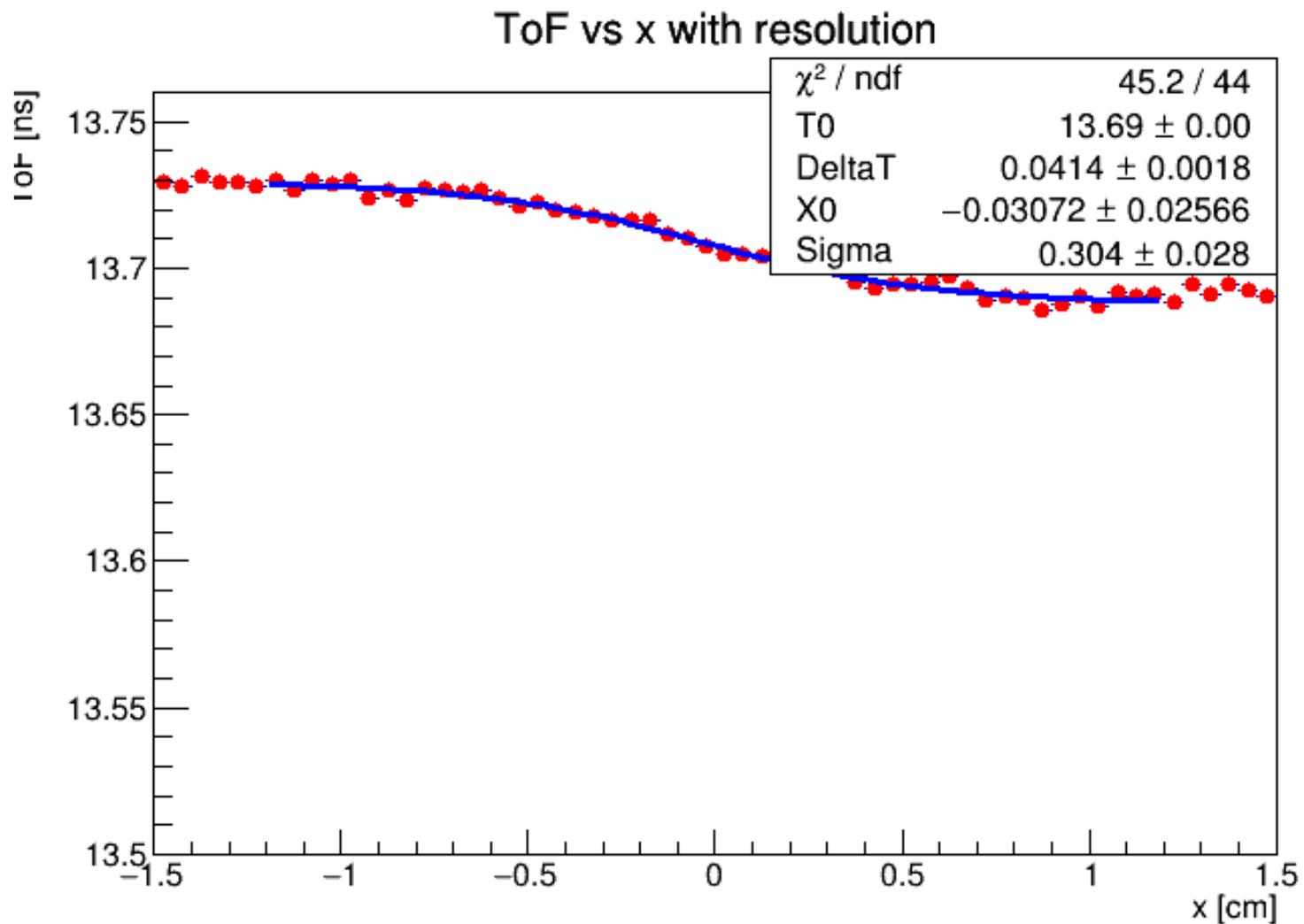
Gap 2mm - smearing 2mm



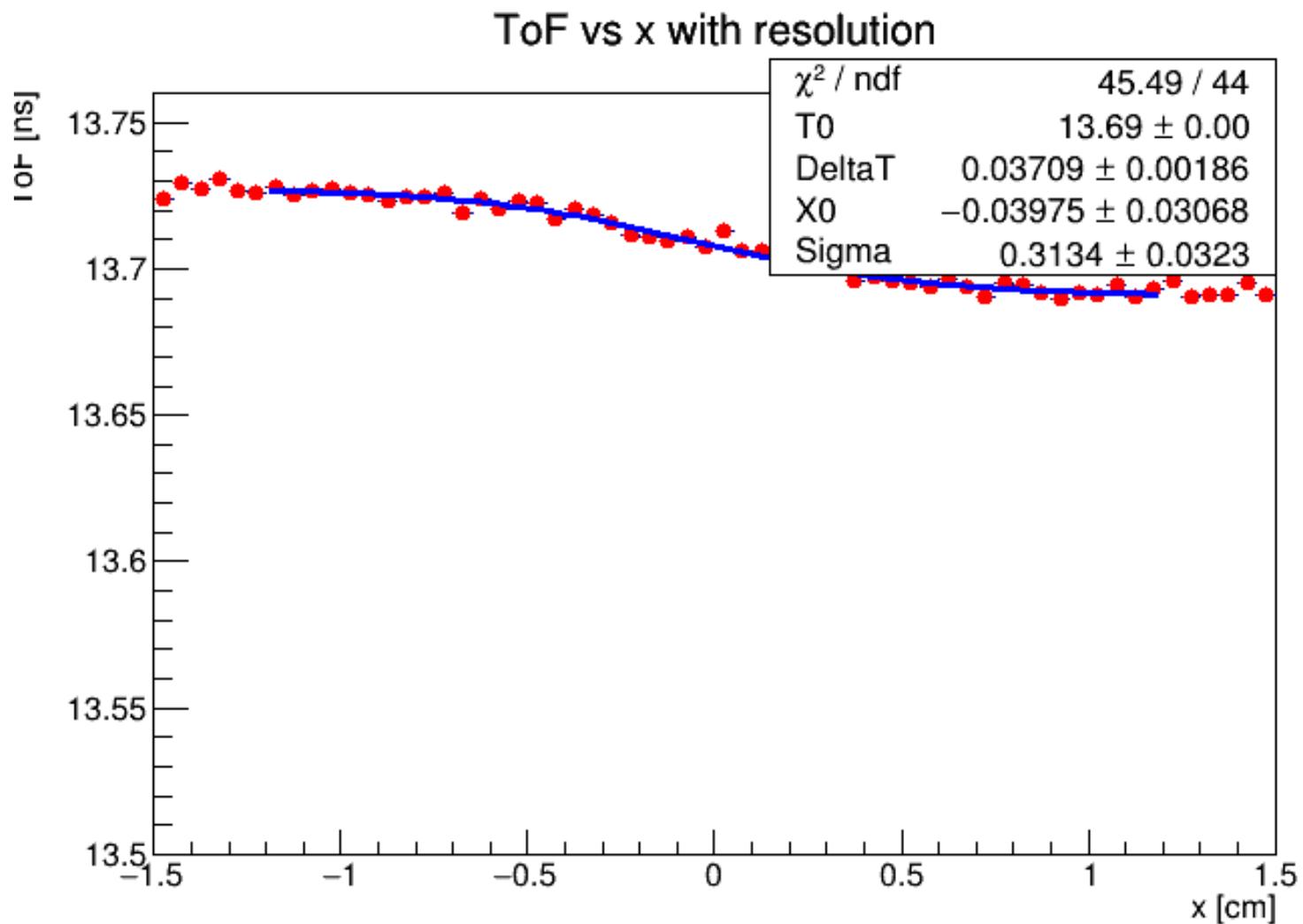
Gap 2mm - smearing 3mm



Gap 2mm - smearing 4mm



Gap 2mm - smearing 5mm

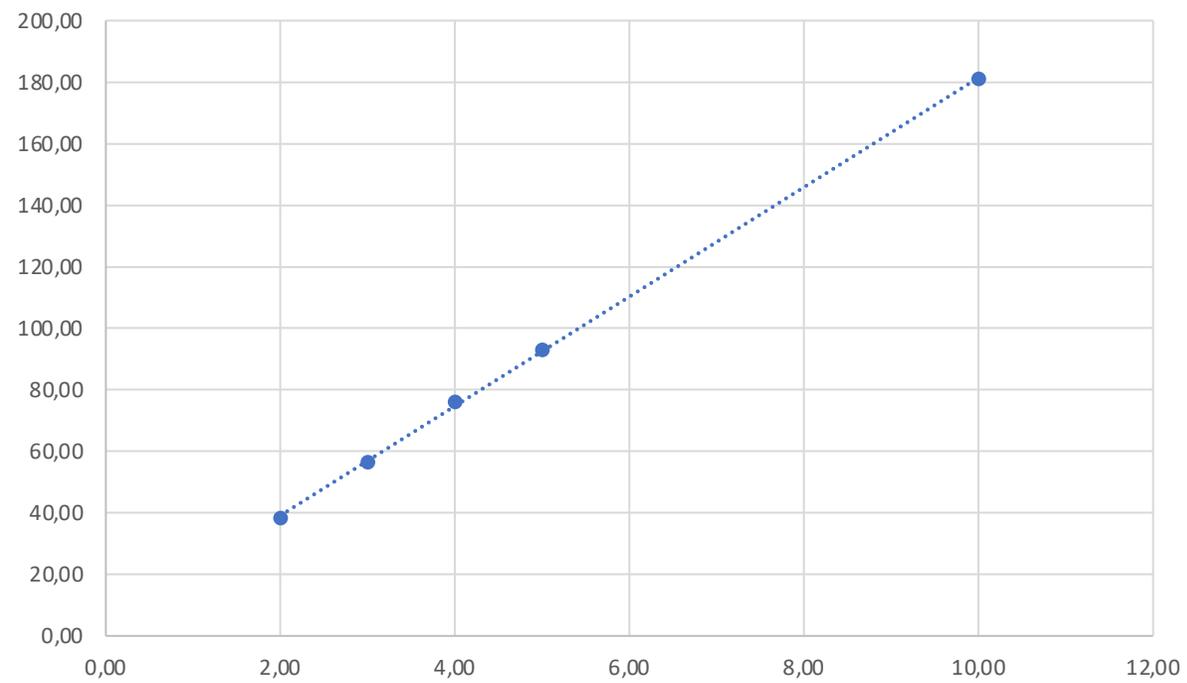


Summary

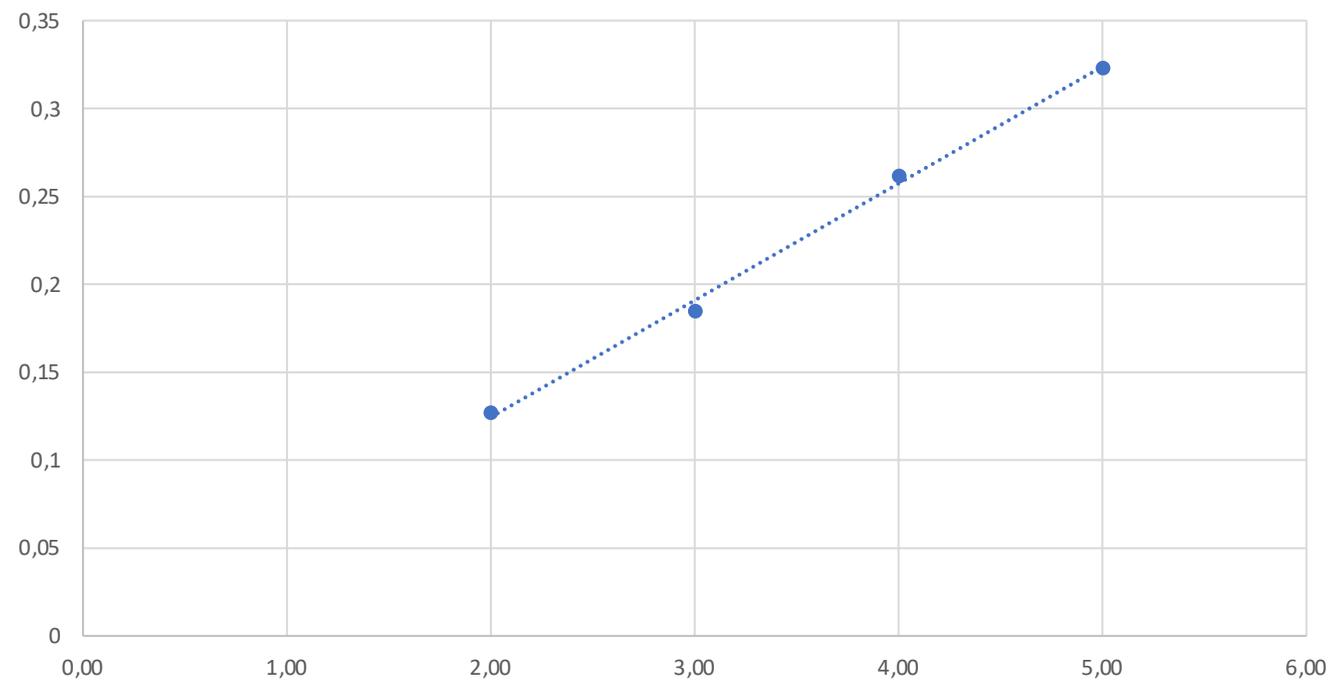
Gap <i>mm</i>	smearing <i>mm</i>	ΔT <i>ns</i>	σ <i>cm</i>
10	2	0.181 ± 0.001	0.127 ± 0.002
5	2	0.093 ± 0.001	0.124 ± 0.004
4	2	0.074 ± 0.001	0.127 ± 0.005
3	2	0.057 ± 0.001	0.128 ± 0.006
2	2	0.038 ± 0.001	0.129 ± 0.010
10	3	0.183 ± 0.001	0.190 ± 0.003
5	3	0.093 ± 0.001	0.183 ± 0.006
4	3	0.076 ± 0.001	0.191 ± 0.007
3	3	0.056 ± 0.001	0.184 ± 0.010
2	3	0.037 ± 0.001	0.176 ± 0.013

Gap <i>mm</i>	smearing <i>mm</i>	ΔT <i>ns</i>	σ <i>cm</i>
10	4	0.183 ± 0.001	0.251 ± 0.005
5	4	0.093 ± 0.001	0.250 ± 0.009
4	4	0.077 ± 0.001	0.270 ± 0.012
3	4	0.056 ± 0.001	0.234 ± 0.013
2	4	0.041 ± 0.002	0.304 ± 0.028
10	5	0.187 ± 0.002	0.340 ± 0.008
5	5	0.094 ± 0.002	0.316 ± 0.013
4	5	0.077 ± 0.002	0.327 ± 0.017
3	5	0.057 ± 0.002	0.319 ± 0.022
2	5	0.037 ± 0.002	0.313 ± 0.032

ΔT vs gap



σ vs smearing



Conclusioni

- σ aumenta con l'aumentare del parametro di smearing
- Per ogni valore del parametro di smearing, σ sembra mantenersi costante al variare della gap e dipendere solo dallo smearing (risoluzione del tracciatore):

$$\sigma \text{ (cm)} \sim 0.069 * \sigma_{\text{smear}} \text{ (mm)} - 0.020$$

- ΔT dipende solo dall'ampiezza della gap:

$$\Delta T \text{ (ps)} \sim 17.68 * \text{gap} \text{ (mm)} + 4.38$$

- E' importante capire e tenere sotto controllo la risoluzione del tracciatore a fibre