TofpRad meeting
Data analysis update
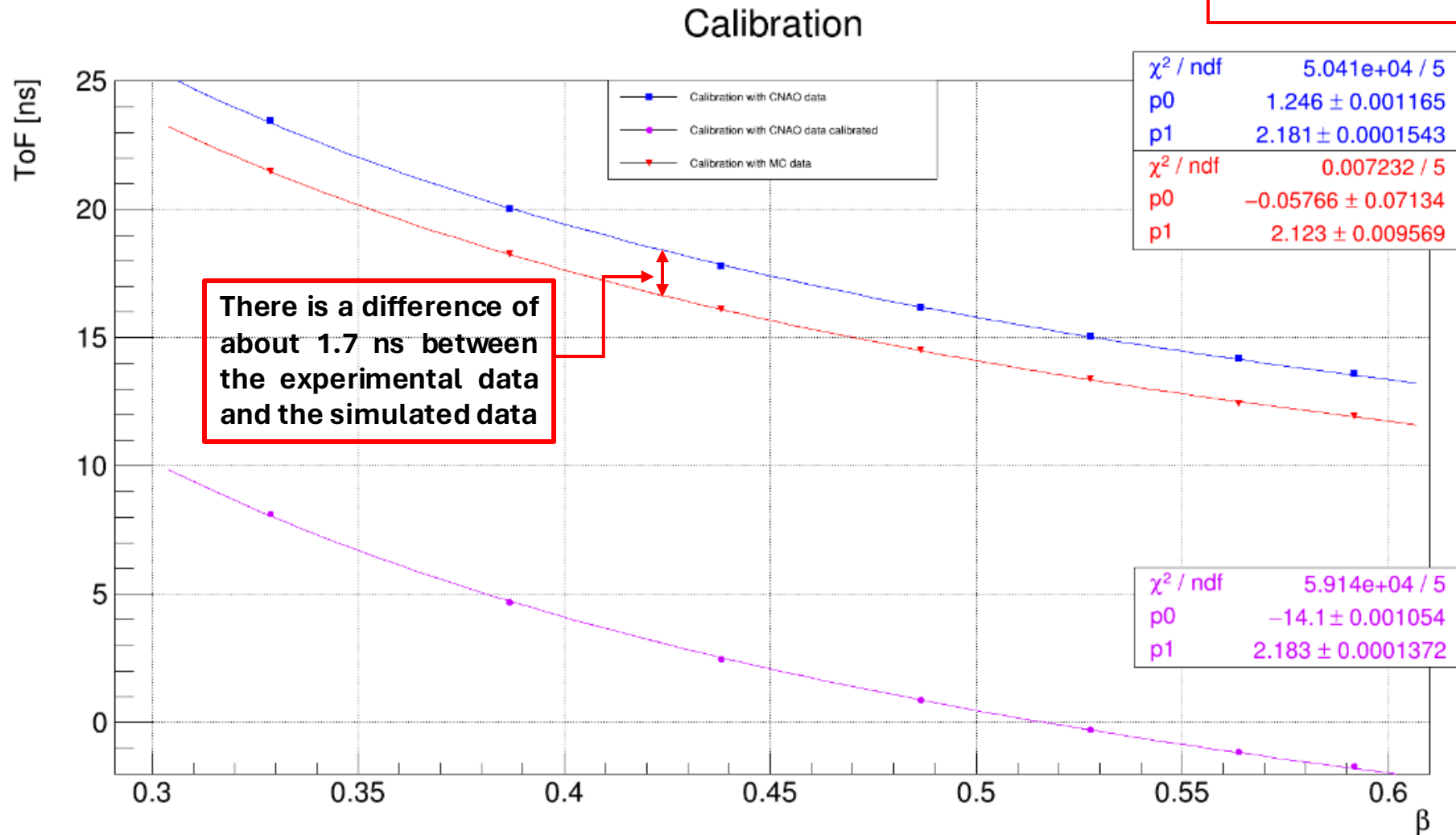
6 giugno 2024

Outline

- Comparison between CNAO and MC dataset;
- Time of Flight vs xHit position on beam monitor as a function of gap position.
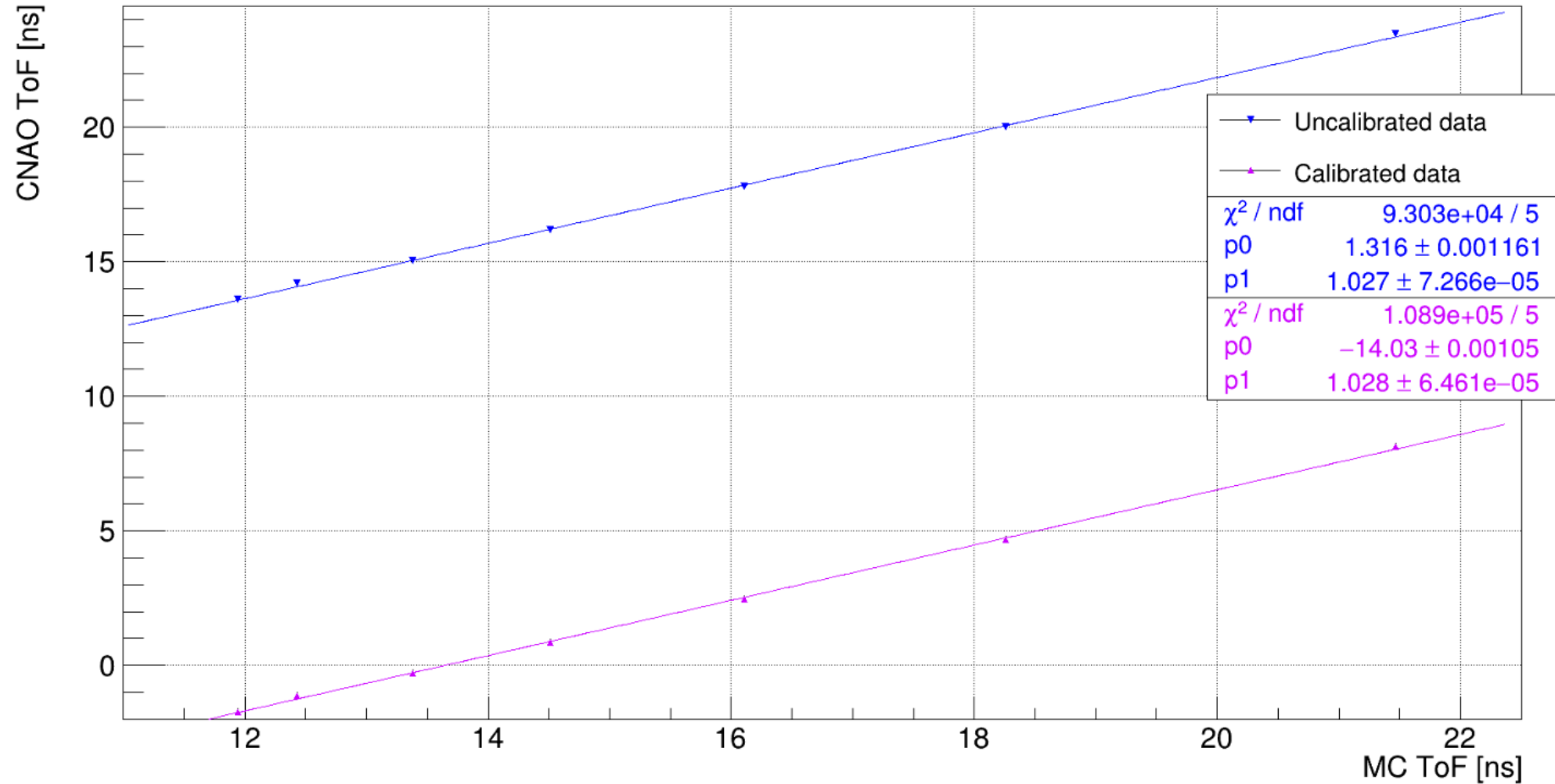
ToF vs β

Fit function:

$$ToF = p_0 + \frac{p_1}{(\beta c)}$$

Calibration
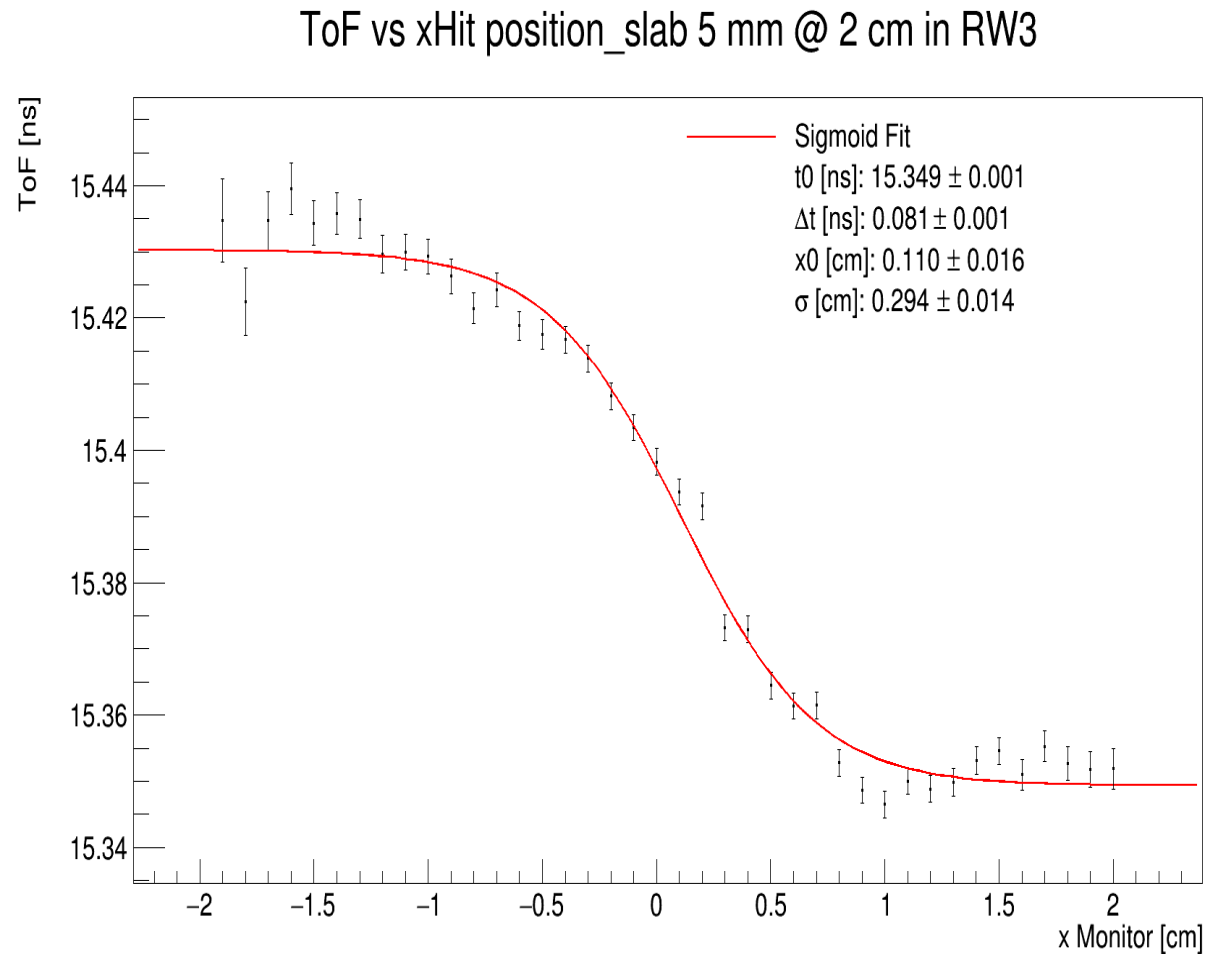

There is a difference of about 1.7 ns between the experimental data and the simulated data

χ^2 / ndf	5.041e+04 / 5
p0	1.246 ± 0.001165
p1	2.181 ± 0.0001543
χ^2 / ndf	0.007232 / 5
p0	−0.05766 ± 0.07134
p1	2.123 ± 0.009569

χ^2 / ndf	5.914e+04 / 5
p0	−14.1 ± 0.001054
p1	2.183 ± 0.0001372

Legend:
- Calibration with CNAO data
- Calibration with CNAO data calibrated
- Calibration with MC data
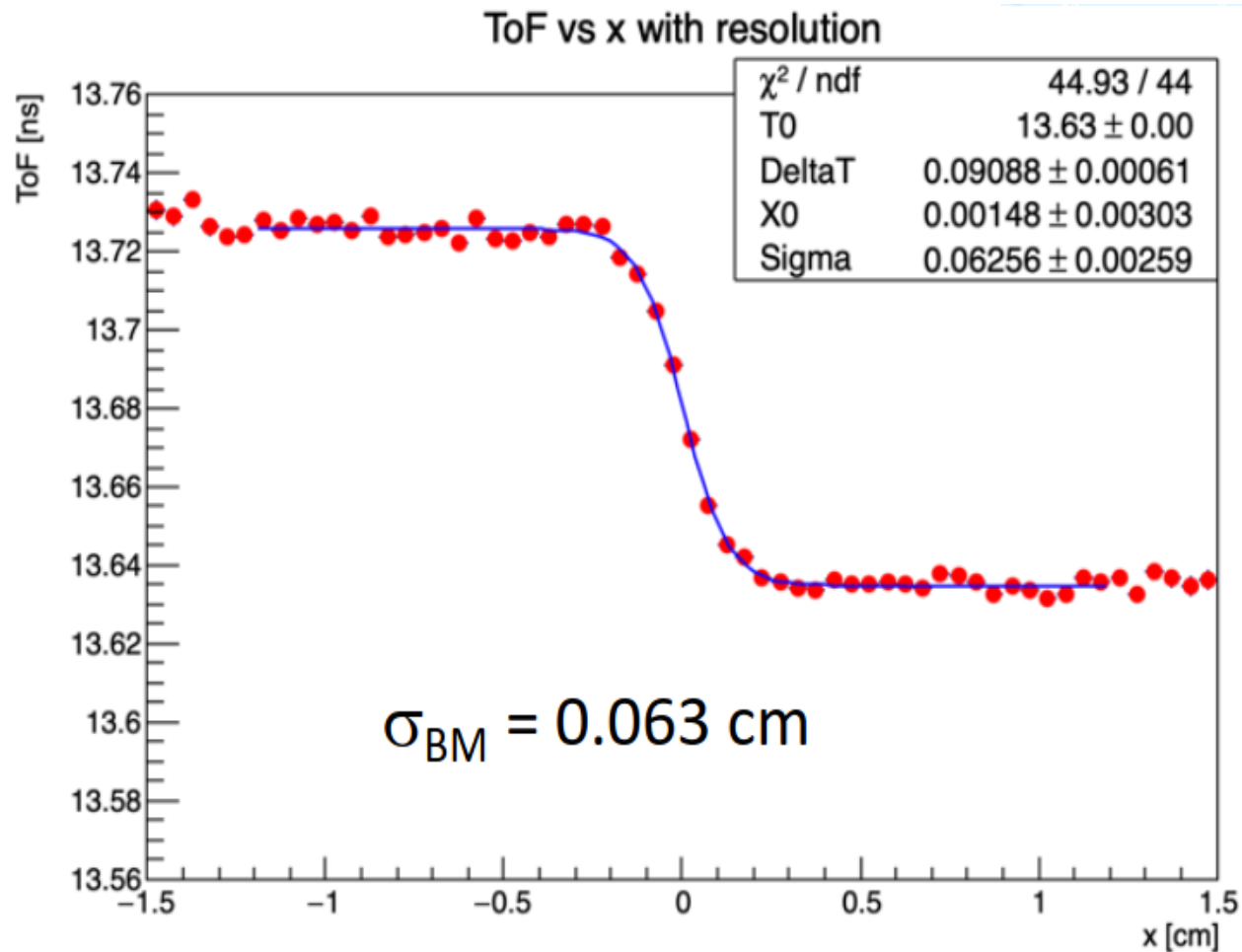
CNAO vs MC dataset

Fit function:

CNAO ToF = p_0+p_1 MC ToF

ToF vs x position on BM
5 mm slab at 2 cm in phantom

ToF vs x with resolution

χ^2 / ndf	44.93 / 44
T0	13.63 ± 0.00
DeltaT	0.09088 ± 0.00061
X0	0.00148 ± 0.00303
Sigma	0.06256 ± 0.00259

$\sigma_{BM} = 0.063$ cm

ToF vs xHit position_slab 5 mm @ 2 cm in RW3

Sigmoid Fit
t0 [ns]: 15.349 ± 0.001
Δt [ns]: 0.081 ± 0.001
x0 [cm]: 0.110 ± 0.016
σ [cm]: 0.294 ± 0.014

ToF vs x position on BM
5 mm slab at 4 cm in phantom

ToF vs x with resolution

χ² / ndf	36.29 / 44
T0	13.63 ± 0.00
DeltaT	0.0922 ± 0.0006
X0	−0.005626 ± 0.003040
Sigma	0.06296 ± 0.00257

σ_{BM} = 0.063 cm

ToF vs xHit position_slab 5 mm @ 4 cm in RW3

Sigmoid Fit
t0 [ns]: 15.347 ± 0.001
Δt [ns]: 0.082 ± 0.002
x0 [cm]: 0.101 ± 0.017
σ [cm]: 0.324 ± 0.016
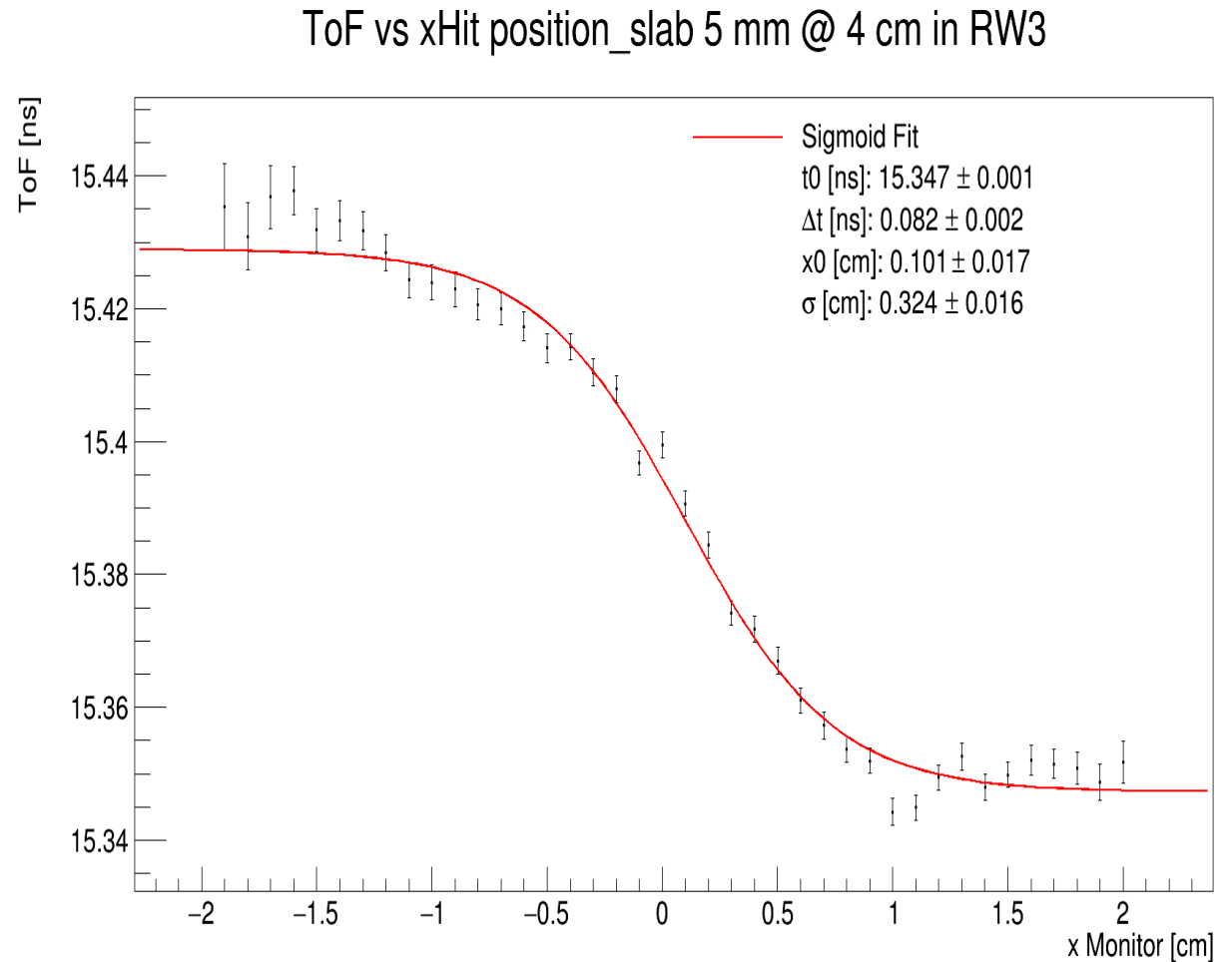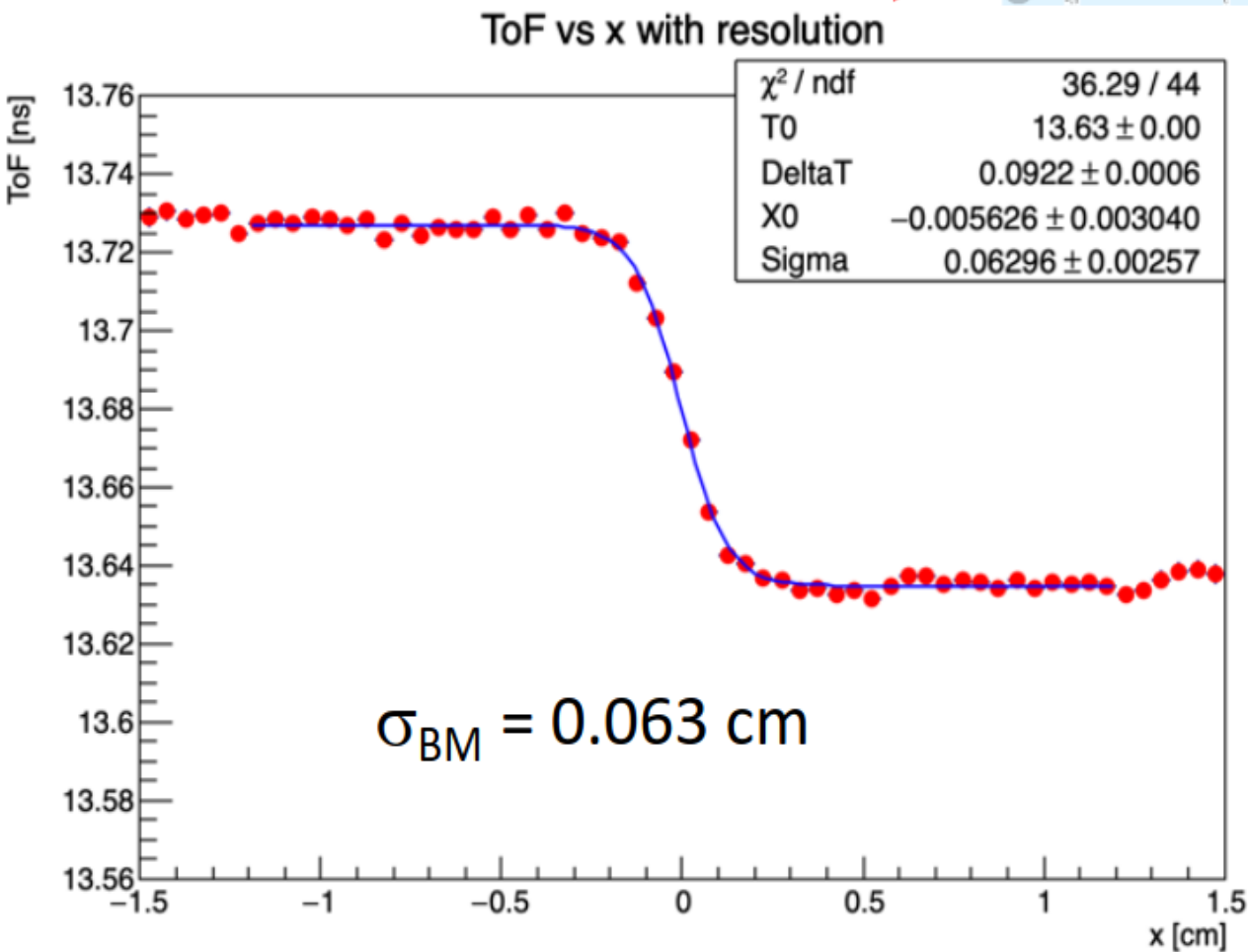
ToF vs x position on BM
5 mm slab at 7 cm in phantom

ToF vs x with resolution

χ^2 / ndf	49.62 / 44
T0	13.63 ± 0.00
DeltaT	0.09333 ± 0.00063
X0	0.001478 ± 0.003353
Sigma	0.07578 ± 0.00285

$\sigma_{BM} = 0.076$ cm

ToF vs xHit position_slab 5 mm @ 7 cm in RW3

Sigmoid Fit
t0 [ns]: 15.343 ± 0.001
Δt [ns]: 0.084 ± 0.001
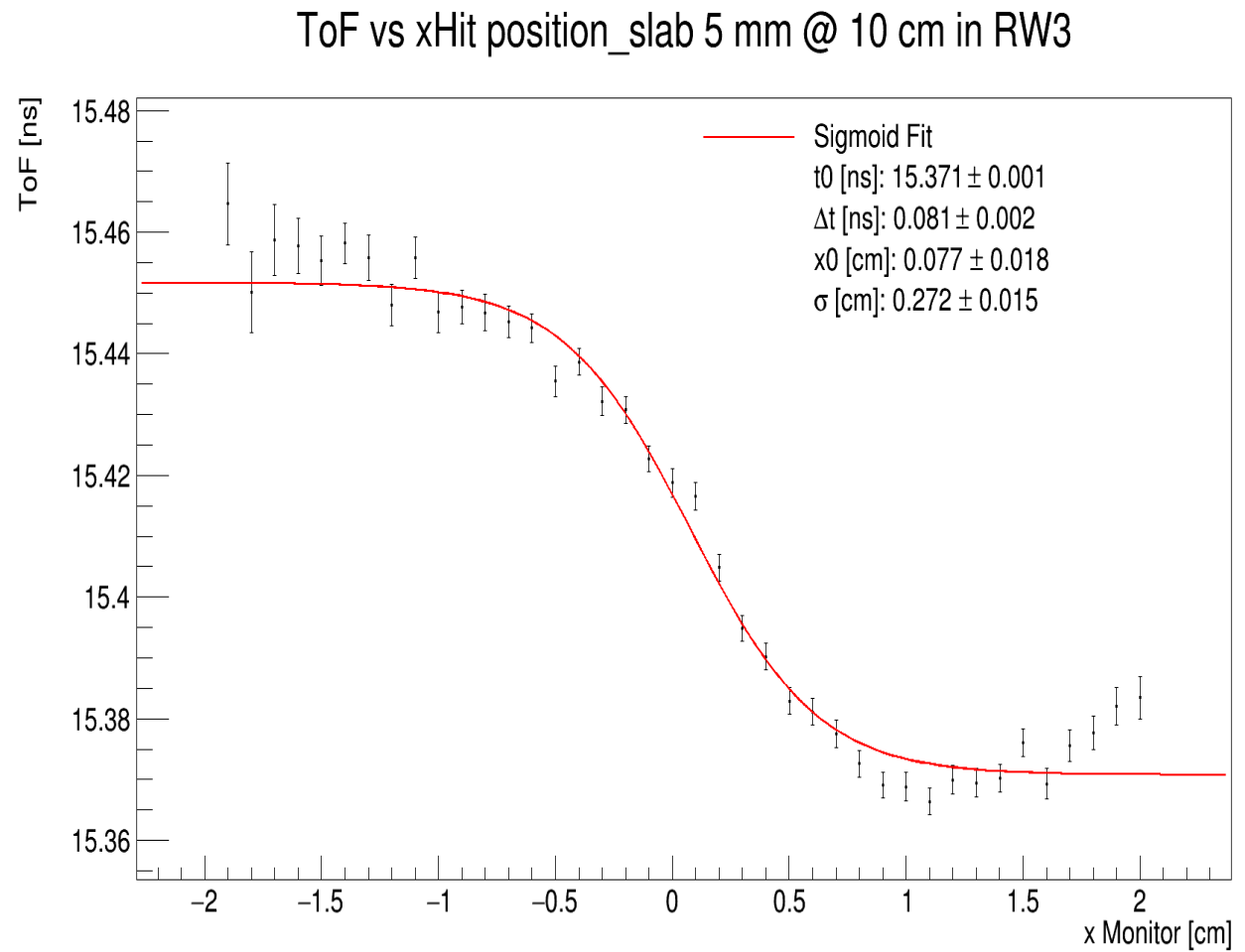x0 [cm]: 0.096 ± 0.013
σ [cm]: 0.313 ± 0.011
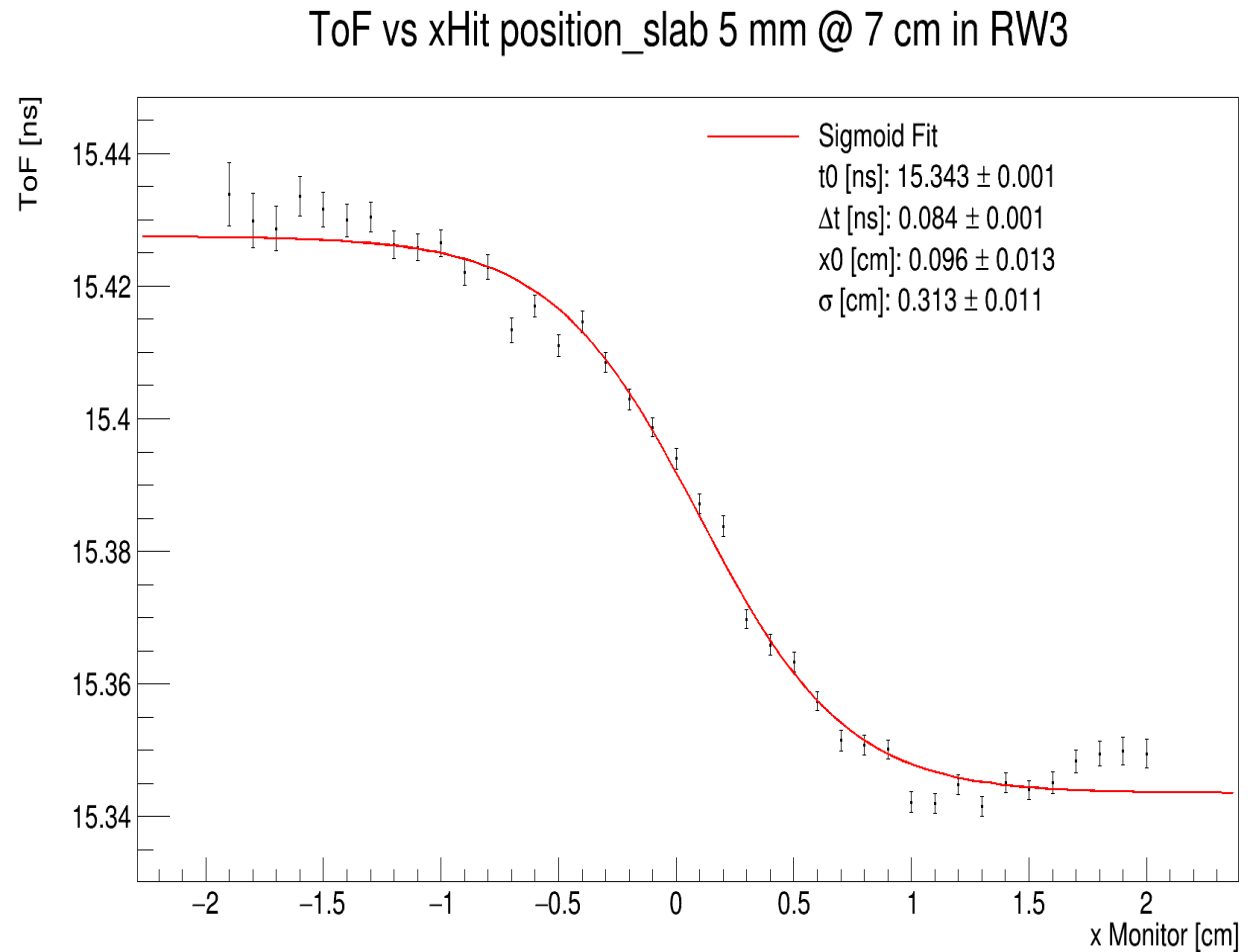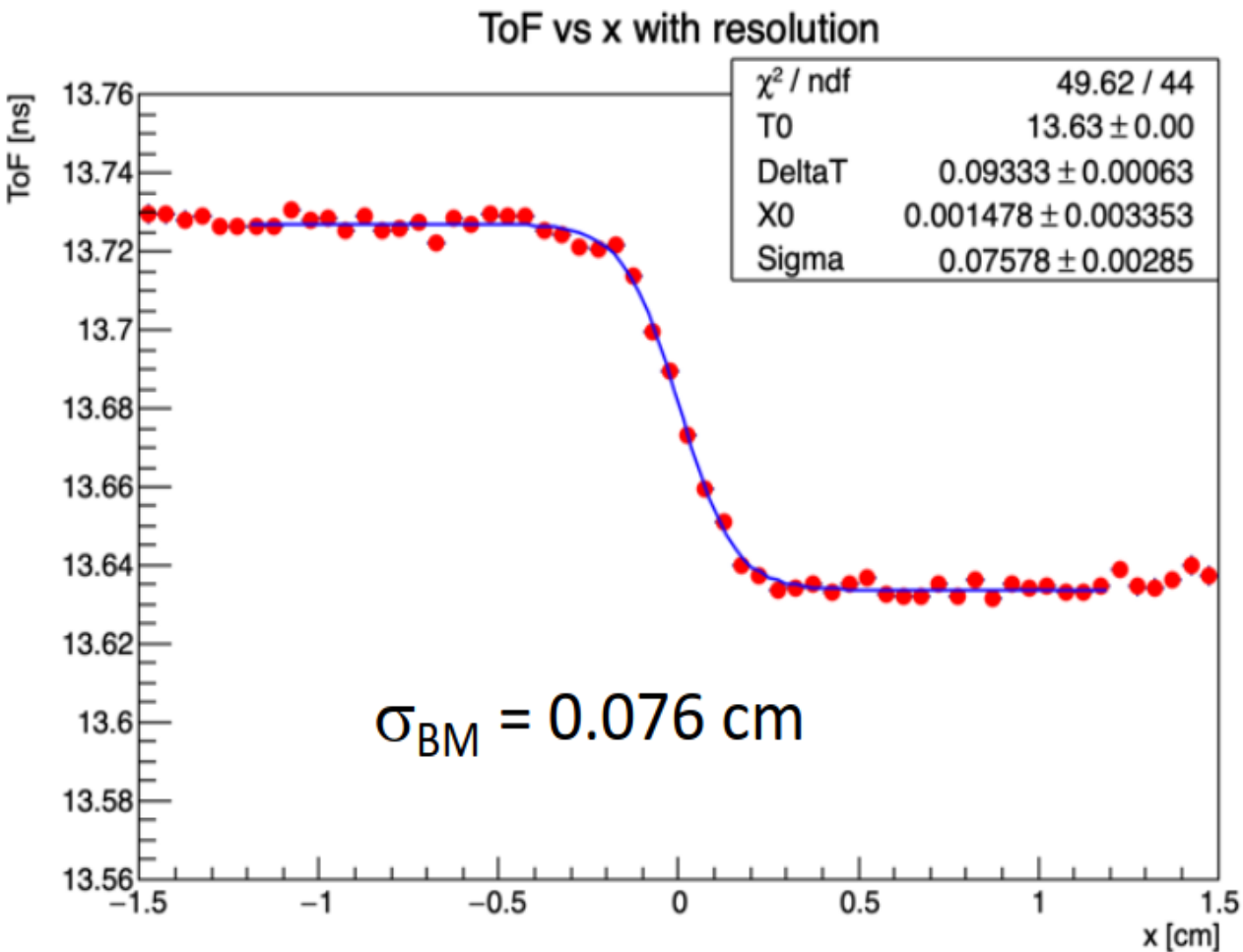
ToF vs x position on BM
5 mm slab at 10 cm in phantom

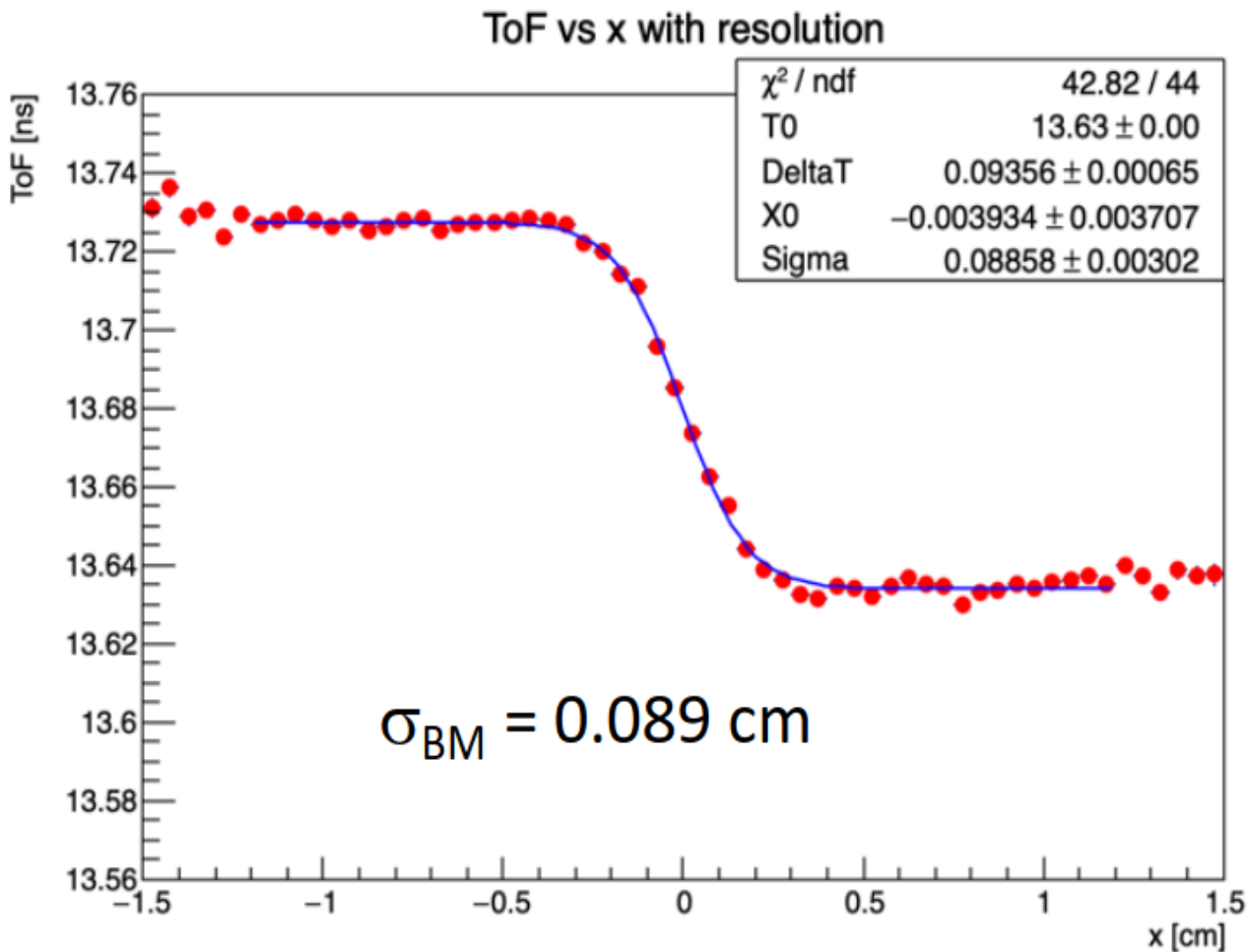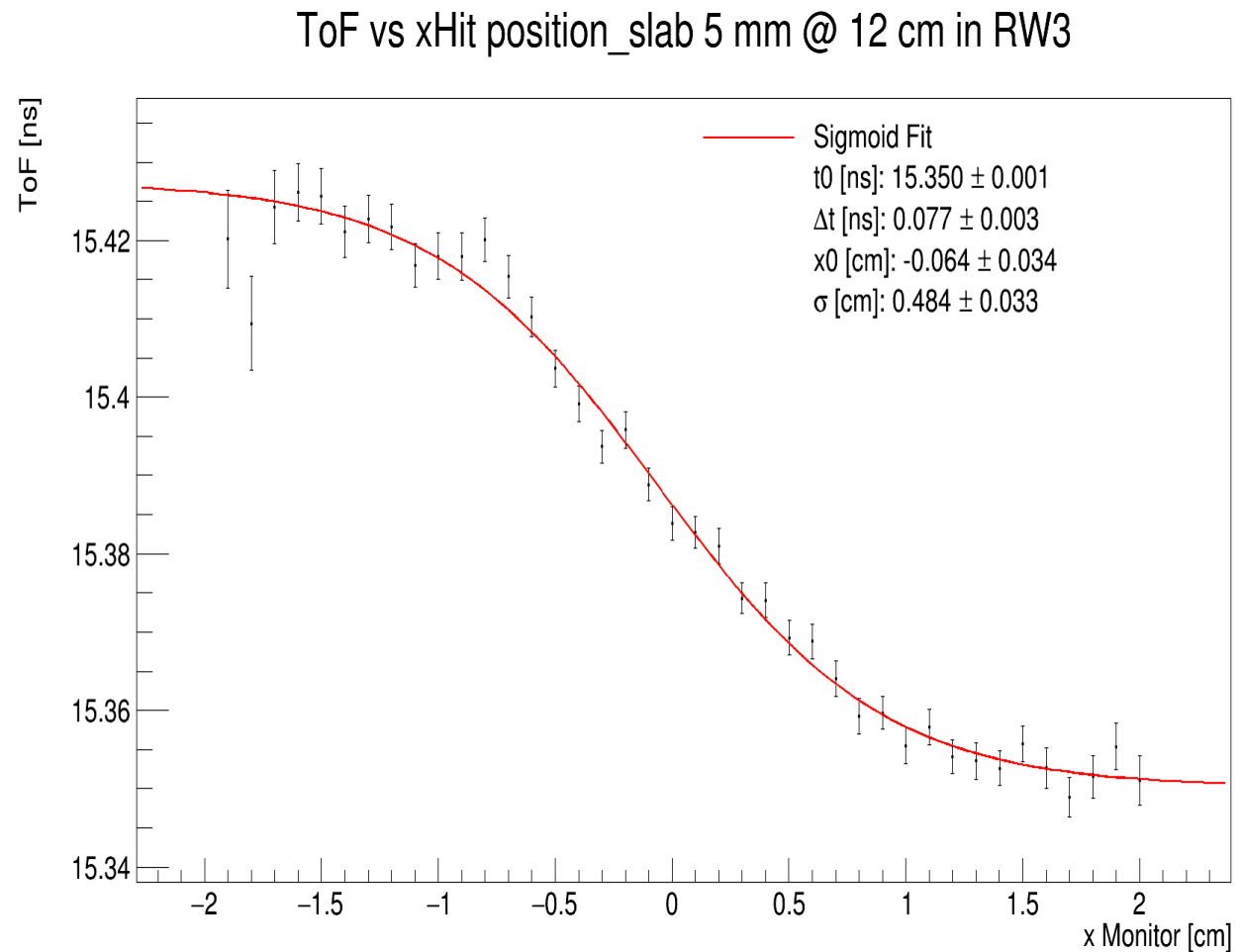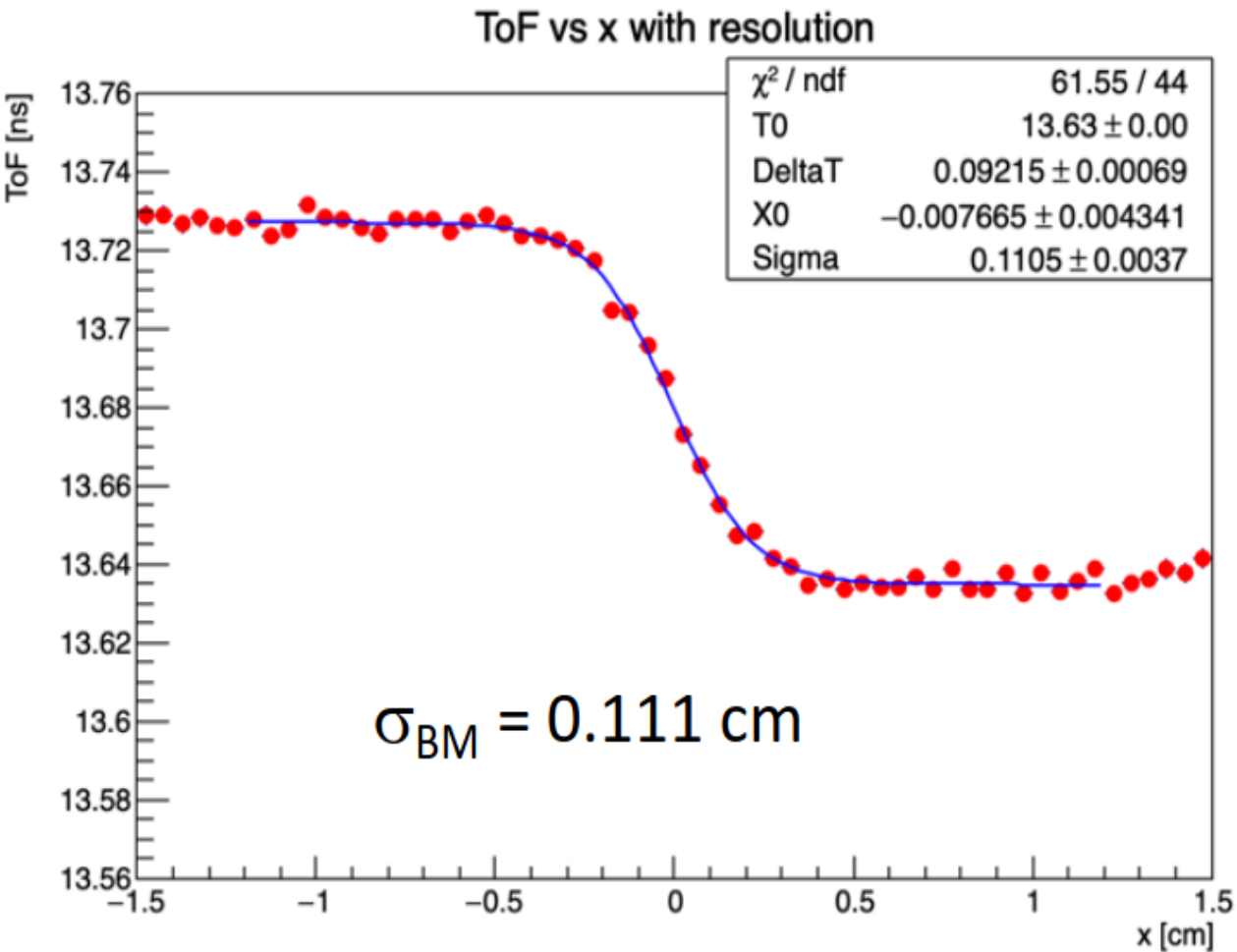# ToF vs x position on BM
5 mm slab at 12 cm in phantom

ToF vs x with resolution

χ^2 / ndf	61.55 / 44
T0	13.63 ± 0.00
DeltaT	0.09215 ± 0.00069
X0	-0.007665 ± 0.004341
Sigma	0.1105 ± 0.0037

$\sigma_{BM} = 0.111$ cm

ToF vs xHit position_slab 5 mm @ 12 cm in RW3

Sigmoid Fit
t0 [ns]: 15.350 ± 0.001
Δt [ns]: 0.077 ± 0.003
x0 [cm]: -0.064 ± 0.034
σ [cm]: 0.484 ± 0.033

σ vs slab position