A fit curve for the photon yield
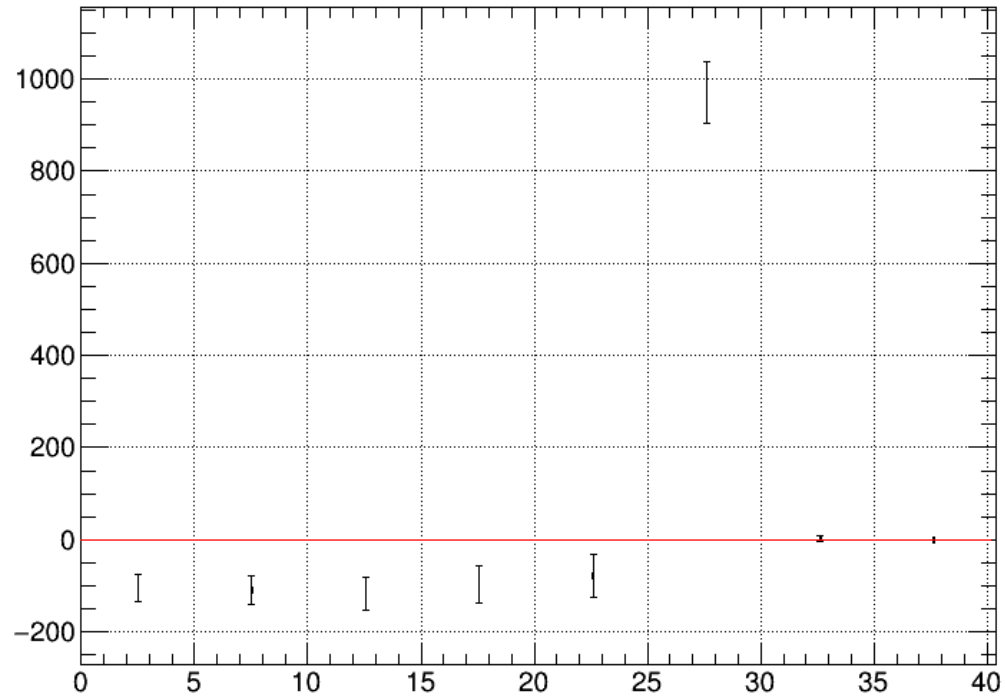
General enhancements and ideas on error bars
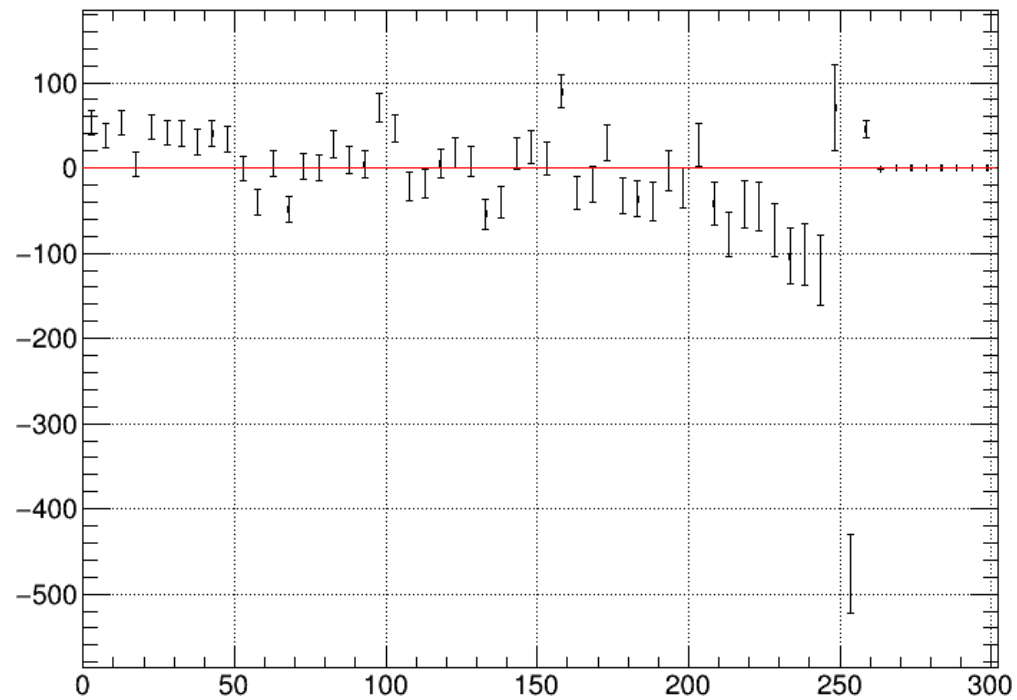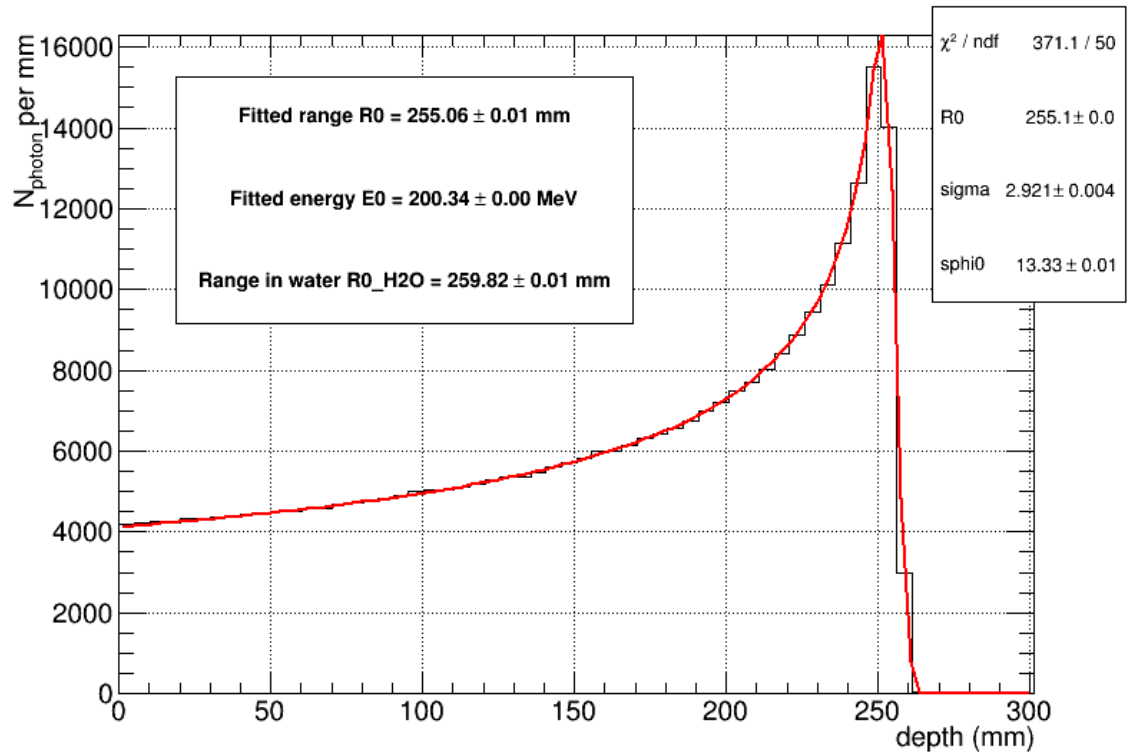
Laurent Kelleter
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State of fit procedure

- Improved fit function (i.e. use less approximations)

- Improved y errors: Take into account fluctuation in energy deposition

- Points scatter nicely around fitted curve

- But scattering becomes huge around Bragg peak

8×5 mm at 60 MeV

Fitted range R0 = 30.44 ± 0.03 mm

Fitted energy E0 = 60.14 ± 0.03 MeV

Range in water R0_H2O = 31.23 ± 0.03 mm

χ² / ndf	260.8 / 4
R0	30.44 ± 0.03
sigma	1.413 ± 0.018
sphi0	10.54 ± 0.02

60×5 mm at 200 MeV

Fitted range R0 = 255.06 ± 0.01 mm

Fitted energy E0 = 200.34 ± 0.00 MeV

Range in water R0_H2O = 259.82 ± 0.01 mm

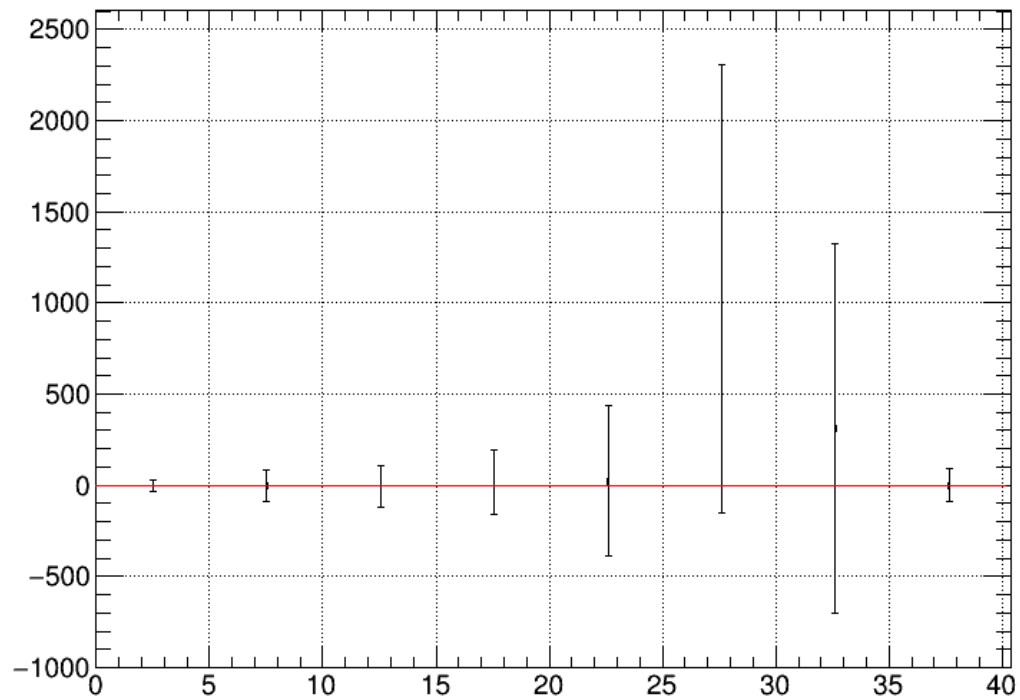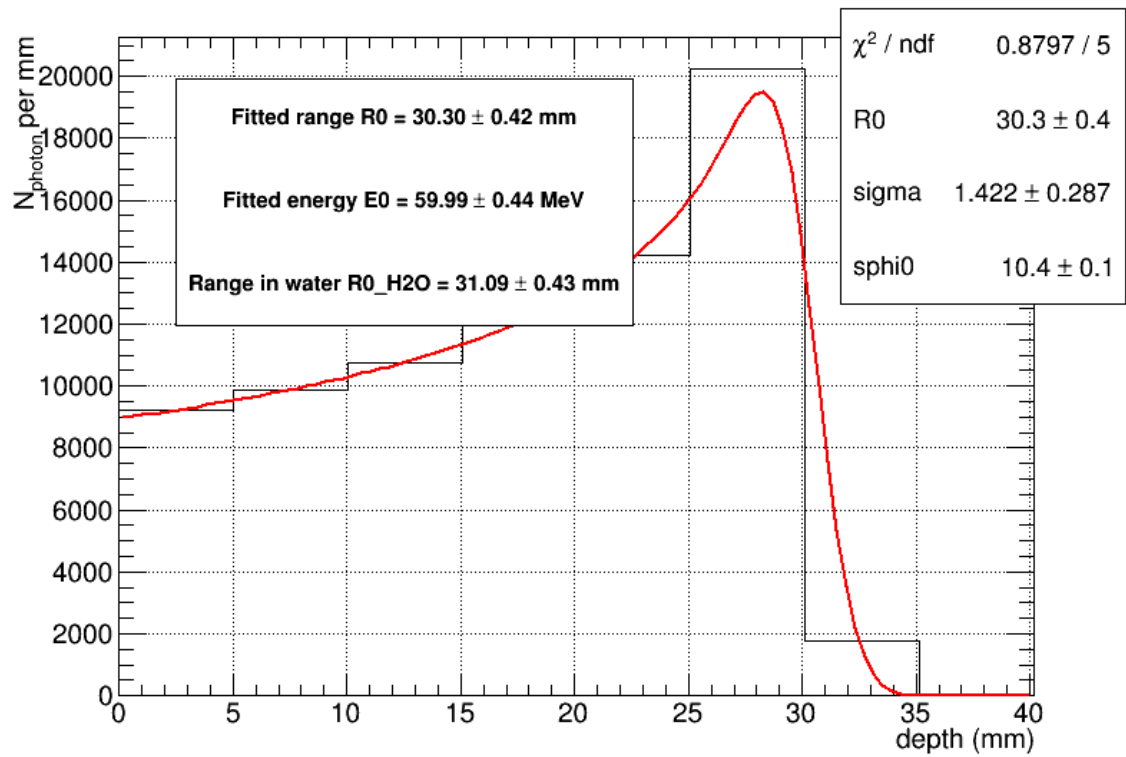|	
χ^2 / ndf	371.1 / 50
R0	255.1± 0.0
sigma	2.921± 0.004
sphi0	13.33 ± 0.01
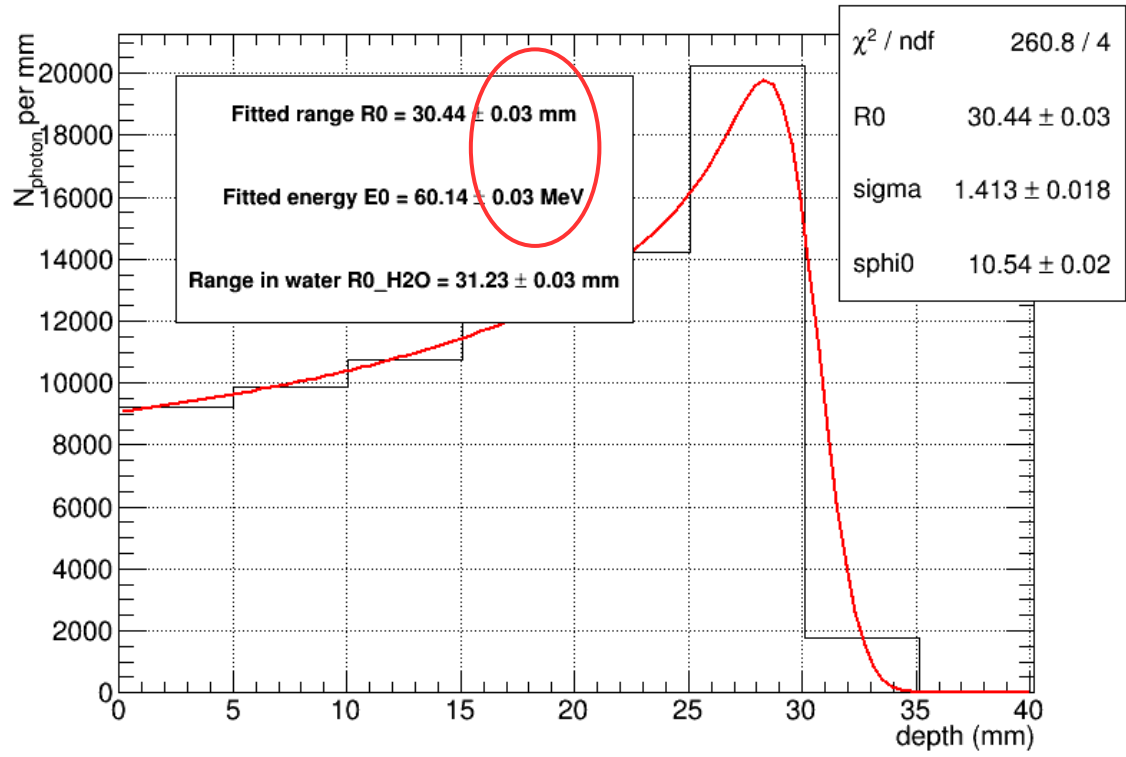
Problem: Error bars

- Problem: Error on fit parameter are unrealistic

- I think it's the y error bars that affect the fit parameter error estimation

- That problem is related to what Simon said about how bin errors are/should be considered by a histogram fit

- Introducing x errors makes fit time consuming/failing

- This is because x errors are translated into y errors via the slope of the fit function in that region

- Idea: Introduce additional artificial y error, dependent on difference of bin content to neighbouring bins

- Add tenth of difference to neighbouring bins to y error as a test

8×5 mm at 60 MeV

Fitted range R0 = 30.30 ± 0.42 mm

Fitted energy E0 = 59.99 ± 0.44 MeV

Range in water R0_H2O = 31.09 ± 0.43 mm

χ^2 / ndf	0.8797 / 5
R0	30.3 ± 0.4
sigma	1.422 ± 0.287
sphi0	10.4 ± 0.1

60×5 mm at 200 MeV

Fitted range R0 = 254.92 ± 0.29 mm

Fitted energy E0 = 200.28 ± 0.13 MeV

Range in water R0_H2O = 259.67 ± 0.30 mm

χ^2 / ndf	132.7 / 51
R0	254.9 ± 0.3
sigma	2.266 ± 0.165
sphi0	13.26 ± 0.04

N_{photon} per mm

depth (mm)