

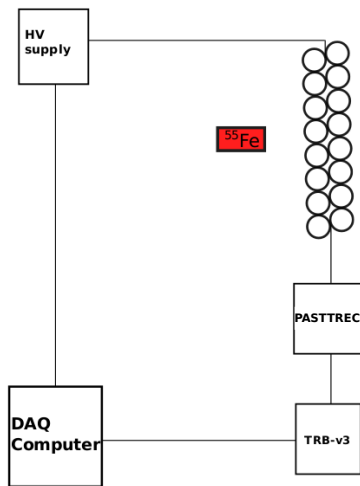
PASTTREC Baseline Tuning

Arkadiusz Popczak, Damian Stachura

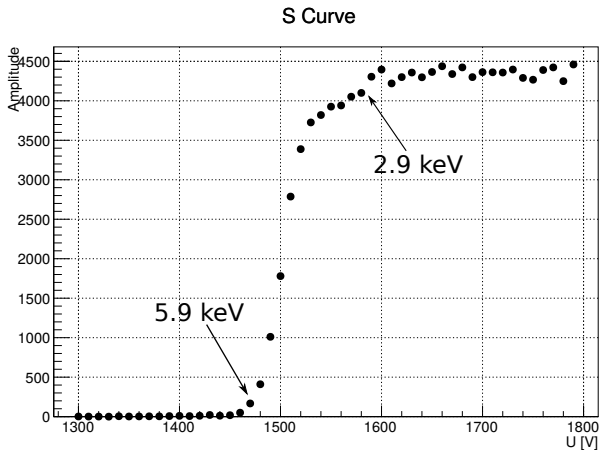
Jagiellonian University

30.01.2017

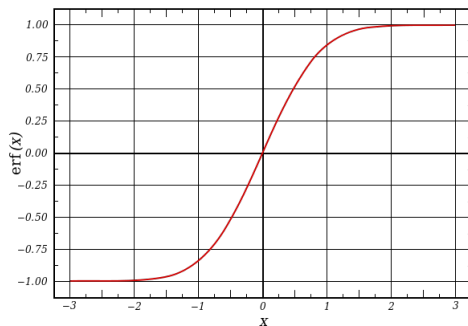
Experimental setup



S curve with ^{55}Fe

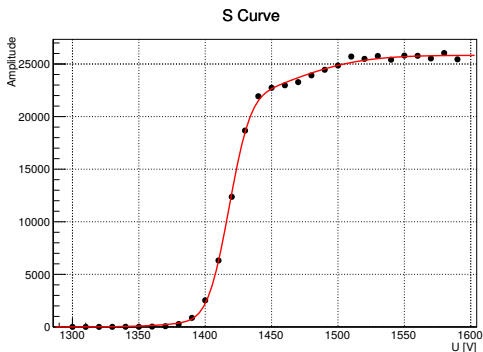


Error function



$$\text{erf}(x) = \frac{1}{\sqrt{\pi}} \int_{-x}^x e^{-t^2} dt \quad (1)$$

Fitting S curve



$$f(x) = A_1 \cdot (1 + \text{Erf}((x - x_1)/\sigma_1)) + A_2 \cdot (1 + \text{Erf}((x - x_2)/\sigma_2))$$

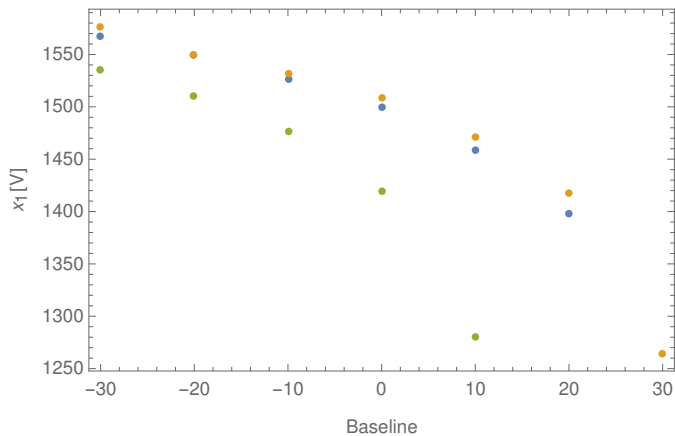
Fitted parameters:

A_1, A_2 - amplitude

x_1, x_2 - slope position

σ_1, σ_2 - slope smearing

Slope position vs. Baseline



Procedure of Baseline tuning

- We chose one x_1 value. (eg. $x_1 = 1500V$)

Procedure of Baseline tuning

- We chose one x_1 value. (eg. $x_1 = 1500V$)
- We tune the baselines to chosen x_1 by bringing slope positions to that value.

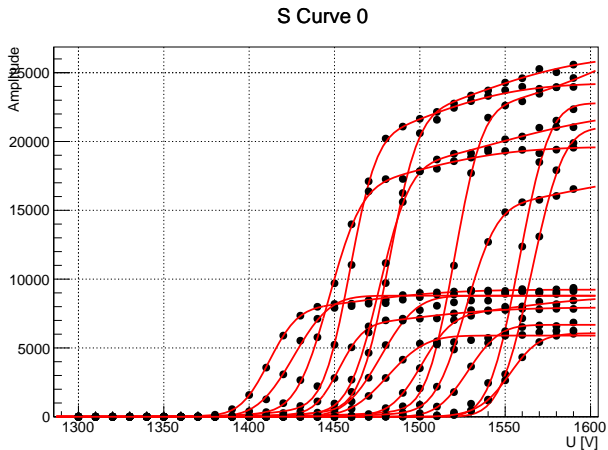
Procedure of Baseline tuning

- We chose one x_1 value. (eg. $x_1 = 1500V$)
- We tune the baselines to chosen x_1 by bringing slope positions to that value.
- The procedure is iterative due to nonlinearity of the baseline - slope position dependence.

Procedure of Baseline tuning

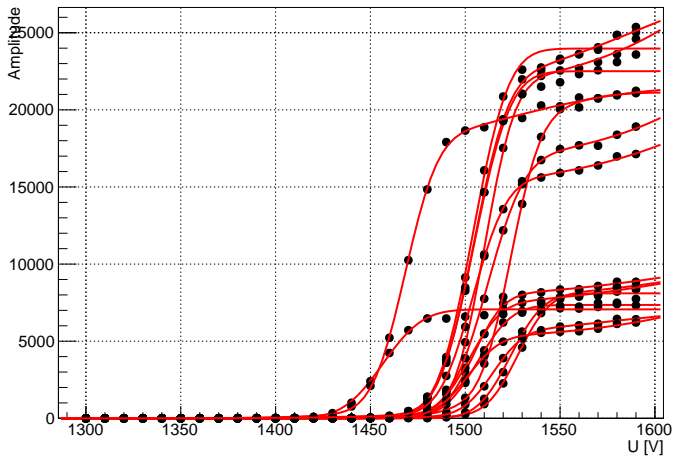
- We chose one x_1 value. (eg. $x_1 = 1500V$)
- We tune the baselines to chosen x_1 by bringing slope positions to that value.
- The procedure is iterative due to nonlinearity of the baseline - slope position dependence.
- In the procedure we apply linear dependence $\Delta Baseline = \frac{\Delta x_1}{a}$

S-curves before tuning



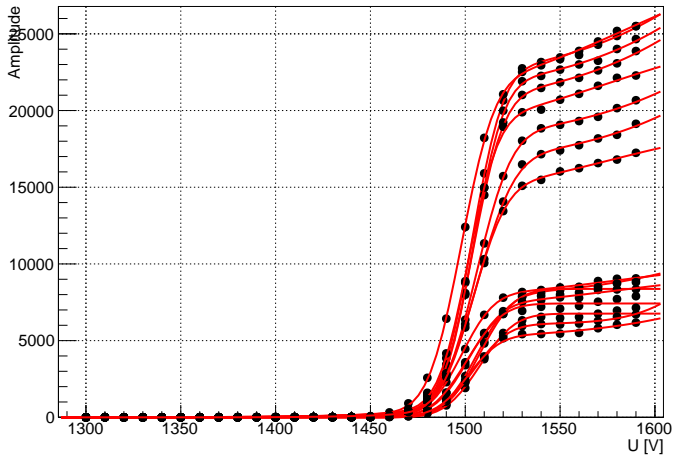
S-curve after the first iteration

S Curve 1



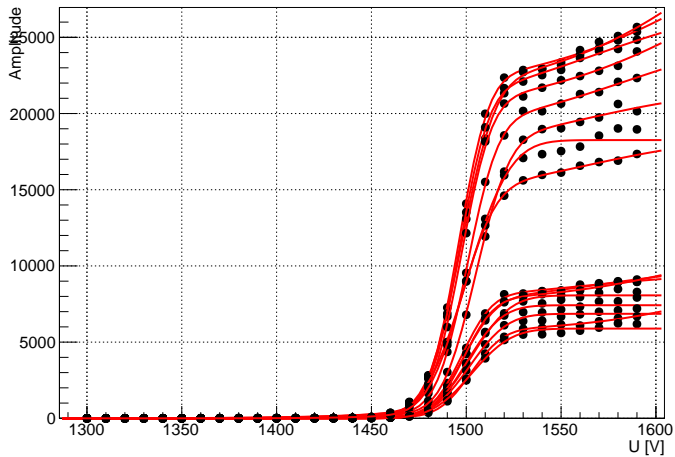
S-curve after the second iteration

S Curve 2



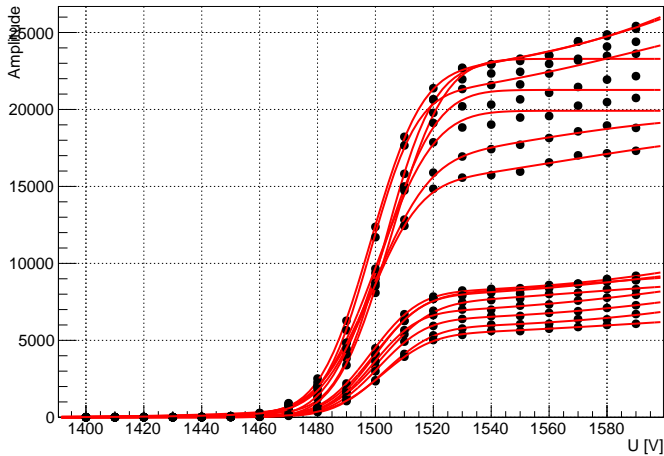
S-curve after the third iteration

S Curve 3

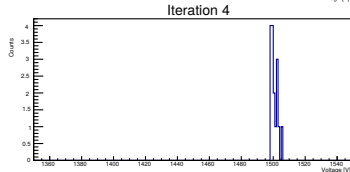
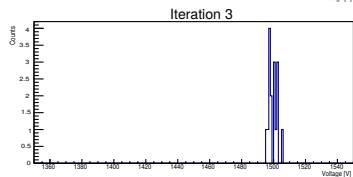
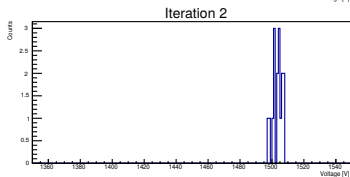
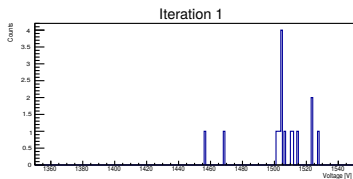
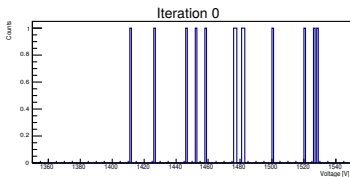


S-curve after the fourth iteration

S Curve 4



S Curve Iterations



- Procedure can be fully automatized.

- Procedure can be fully automatized.
- No changes in stability of the baseline were observed after two weeks.

- Procedure can be fully automatized.
- No changes in stability of the baseline were observed after two weeks.
- We should check stability of the baseline over longer period of time (a few months).