

HMS Luminosity Scan

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Procedure

Using the TSelector framework, I applied several cuts to the data:

- ▶ $|\beta - 1.0| < 0.2$
- ▶ $\chi^2/N < 25.0$
- ▶ $E_{\text{Cal, Norm}} > 0.8$
- ▶ $|\delta| < 8.0$
- ▶ $|\theta| < 0.080$
- ▶ $|\phi| < 0.035$
- ▶ $|\text{BCM17} - \text{Current}| < 0.1 * \text{Current}$

To get the total number of good events. Procedure to get BCM17 information is outlined at

https://hallcweb.jlab.org/DocDB/0009/000949/001/bcm_check_module.pdf

Procedure

From the REPORT file output from hcana, I read the:

- ▶ prescaler
- ▶ charge
- ▶ computer live time
- ▶ electronic live time
- ▶ tracking efficiency

where the prescaler is applied according to the formula

$$\text{True Counts} = \text{Counts} * (2^{\text{Prescale}-1} + 1)$$

and the reported charge is scaled by the fraction of events that passed the good selection.

Procedure

To calculate Normalized Yield, the equation used is

$$\text{Normalized Yield} = \frac{\sum \text{Good Counts} * (2^{\text{Prescale}-1} + 1)}{\text{Total Charge} * \eta_{\text{Comp Live}} * \eta_{\text{Elect Live}} * \eta_{\text{Track}}}$$

Results

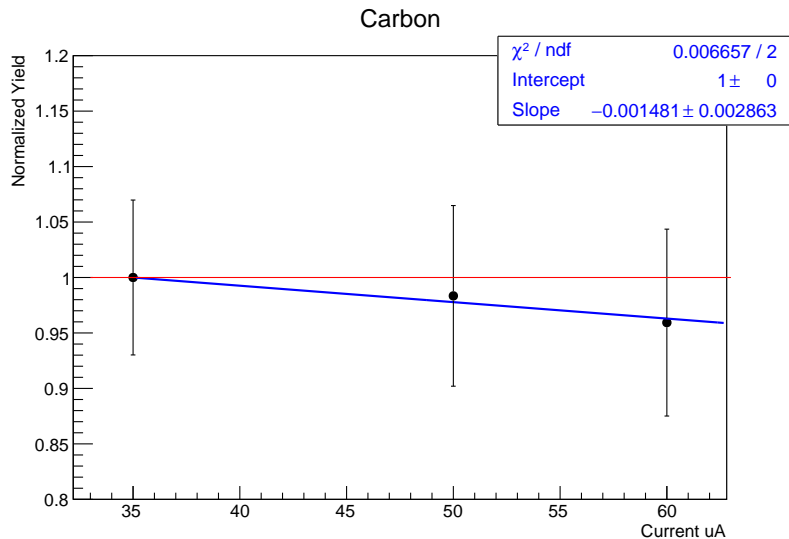


Figure 1 : Normalized Yield for Carbon target

Results

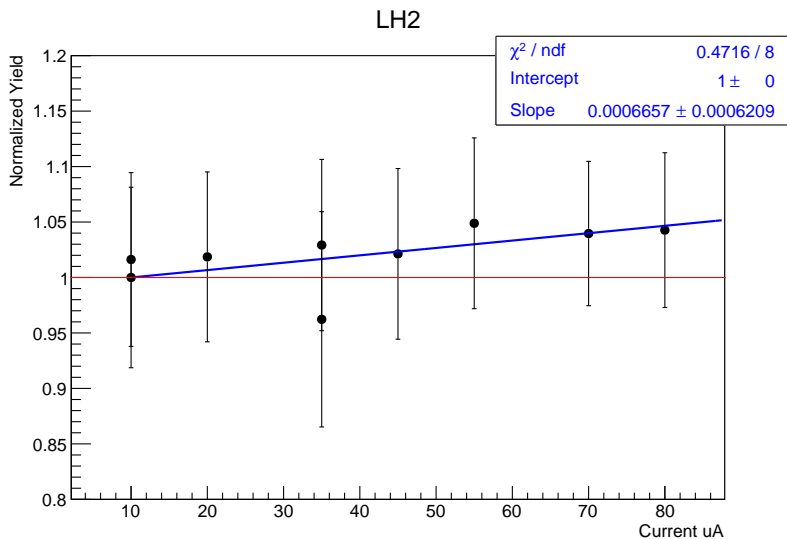


Figure 2 : Normalized Yield for liquid Hydrogen target

Results

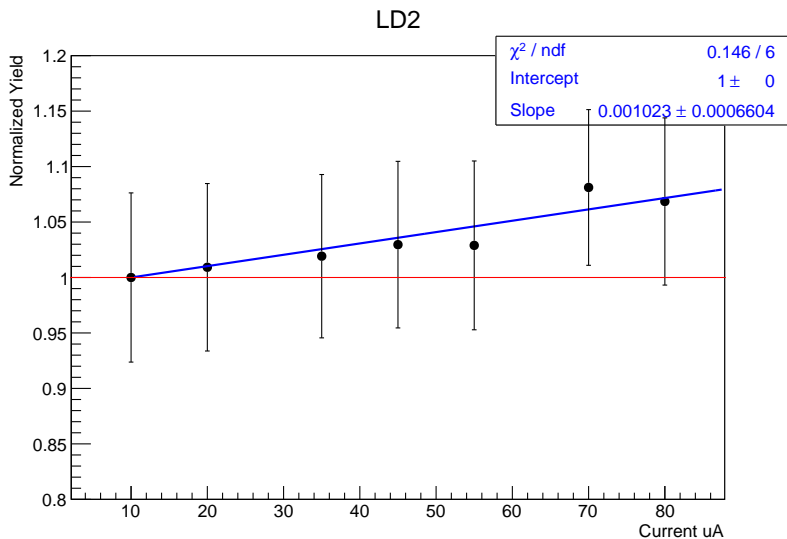


Figure 3 : Normalized Yield for liquid Deuterium target

Work to be Done

- ▶ Refine error bars (read from scalar information electronic/computer dead time error)
- ▶ Refine calculation of charge (use scalar information)
- ▶ Carefully account for impact of ignoring scalar events on various efficiencies
- ▶ Apply to SHMS scans