Kaon LT Status Update

May 4th, 2023

Richard Trotta
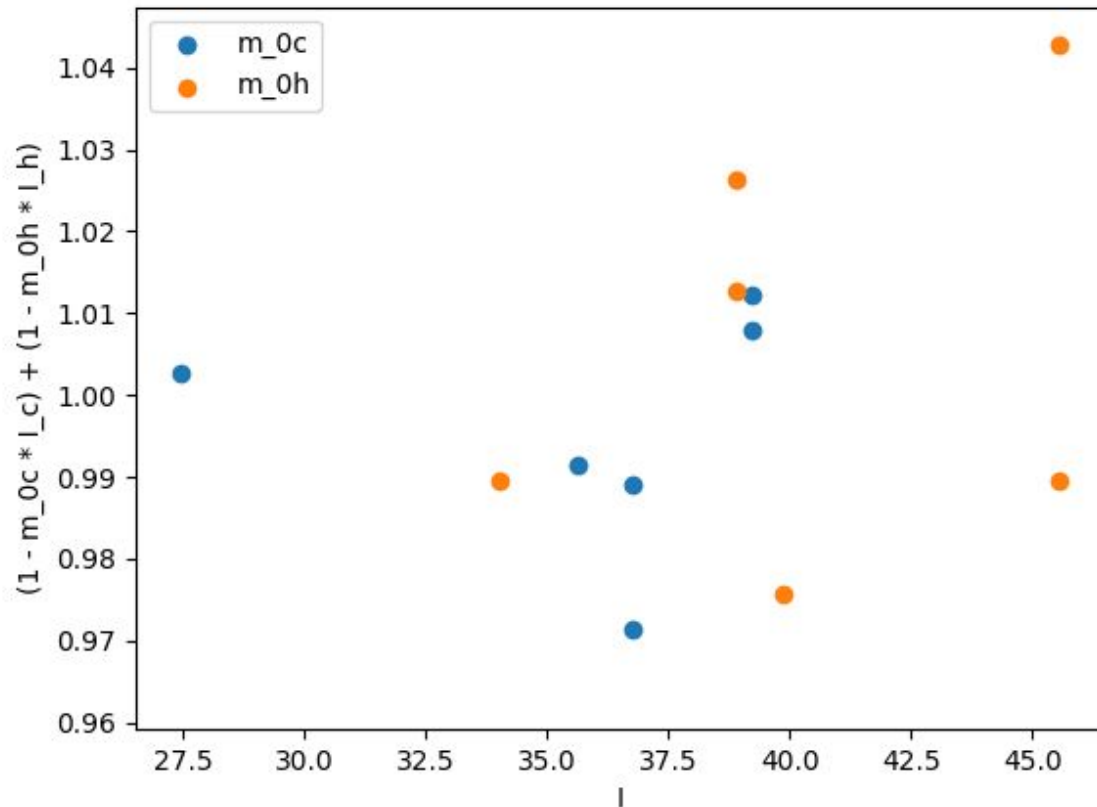
Target Boiling

Target	Slope, $m_0 \equiv m/Y_0$
Carbon-12	-1.87×10^4
LH$_2$	-6.34×10^4
LD$_2$	-8.00×10^4

$$\epsilon_{\text{tgt.Boil}} = 1 - m_0 \cdot I_{\text{avg}}$$
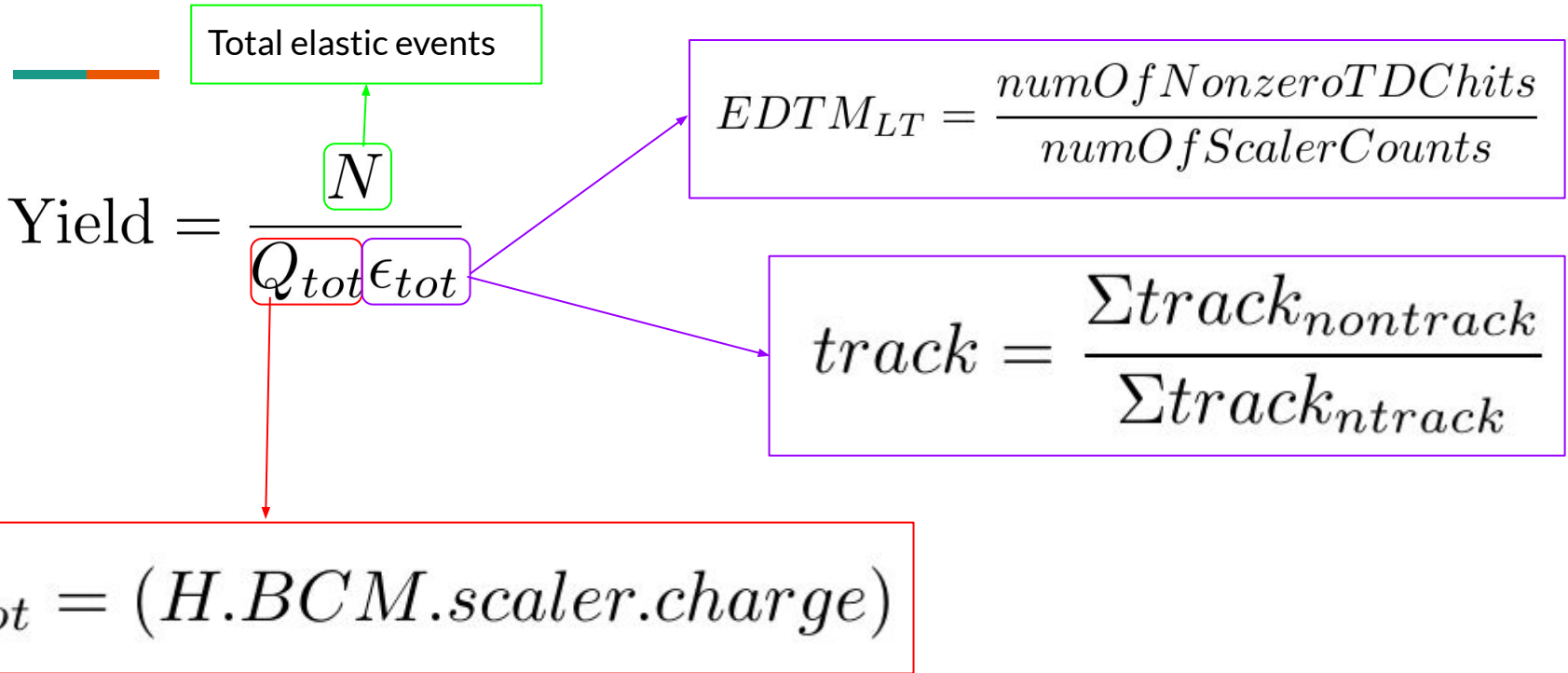
Target Boiling

extra

Scaler Yield Calculation

$$N_{scaler} = \Sigma(trigscaler) - EDTM_{scaler}$$

$$Y_{scaler} = \frac{N_{scaler}}{Q_{tot}}$$

$$Q_{tot} = (H.BCM.scaler.charge)$$

Yield Calculation

Total elastic events

$$\text{Yield} = \frac{N}{Q_{tot}\,\epsilon_{tot}}$$

$$EDTM_{LT} = \frac{numOfNonzeroTDChits}{numOfScalerCounts}$$

$$track = \frac{\Sigma track_{nontrack}}{\Sigma track_{ntrack}}$$

$$Q_{tot} = (H.BCM.scaler.charge)$$

Lumi Cuts

- tdcTimeRaw cuts on pTrigs and EDTM
- Evttype cuts (HMS Evttype==2, SHMS Evttype==1)
- abs(current-setcurrent) < 2.5

SHMS (pion)
- P_hgcer_npeSum > 1.5
- P_aero_npeSum > 1.5
- P_cal_etottracknorm < 0.3

SHMS (electron)
- P_hgcer_npeSum > 0.5
- P_aero_npeSum > 2.0
- P_cal_etotnorm > 0.8

HMS (electron)
- H_cer_npeSum > 6.0
- H_cal_etottracknorm > 0.6

Track Lumi Cuts

- tdcTimeRaw cuts on pTrigs and EDTM
- Evttype cuts (HMS Evttype==2, SHMS Evttype==1)
- abs(current-setcurrent) < 2.5
- (P)H_goodscinhits == 1
- abs(P_gtr_beta-1) > 0.3

SHMS (pion)

- P_hgcer_npeSum > 1.5
- P_aero_npeSum > 1.5
- P_cal_etottracknorm < 0.3

SHMS (electron)

- P_hgcer_npeSum > 0.5
- P_aero_npeSum > 2.0
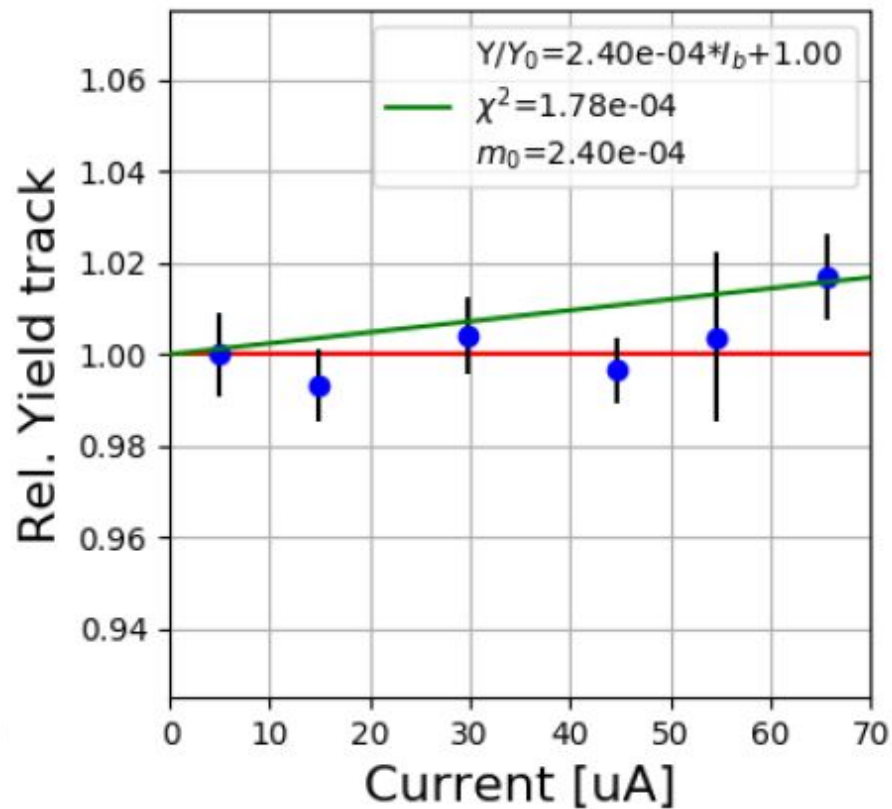- P_cal_etotnorm > 0.8

HMS (electron)

- H_cer_npeSum > 6.0
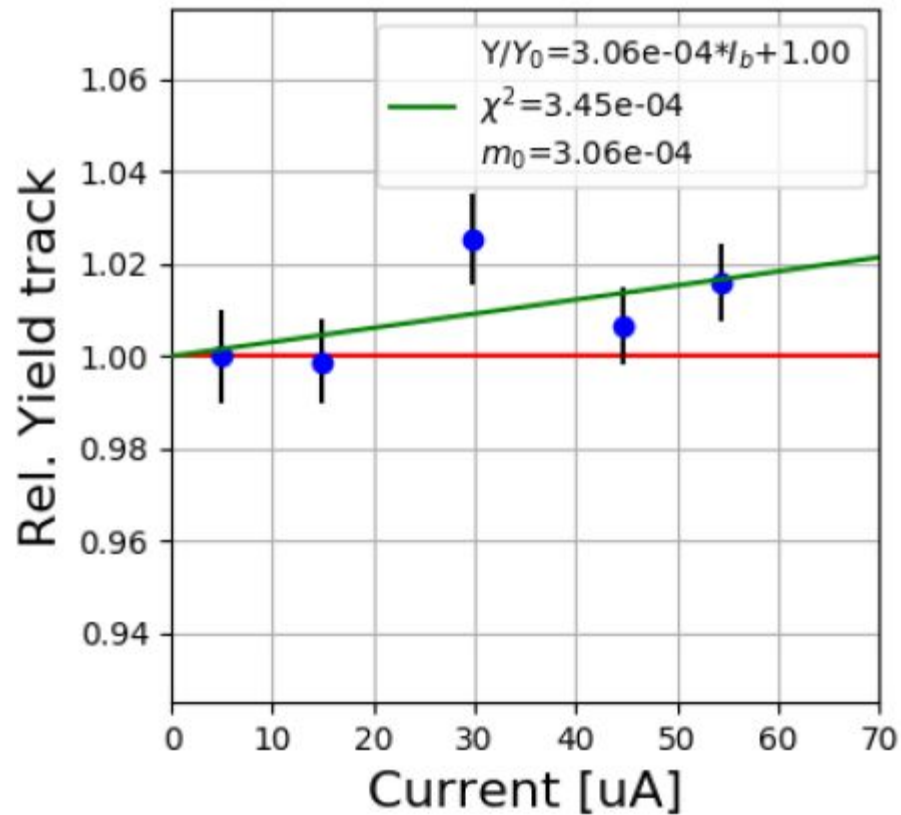- H_cal_etottracknorm > 0.6

10.6 Lumi Run #1

- P_SHMS = +6.842, Theta_SHMS = 6.495
- P_HMS = -3.266, Theta_HMS = 12.530

HMS Carbon 5154-5298

$Y/Y_0 = 2.40\text{e-}04 * I_b + 1.00$

$\chi^2 = 1.78\text{e-}04$

$m_0 = 2.40\text{e-}04$

Rel. Yield track

Current [uA]

HMS LH2 5150-5166

$Y/Y_0 = 3.06\text{e-}04 * I_b + 1.00$

$\chi^2 = 3.45\text{e-}04$

$m_0 = 3.06\text{e-}04$

Rel. Yield track

Current [uA]
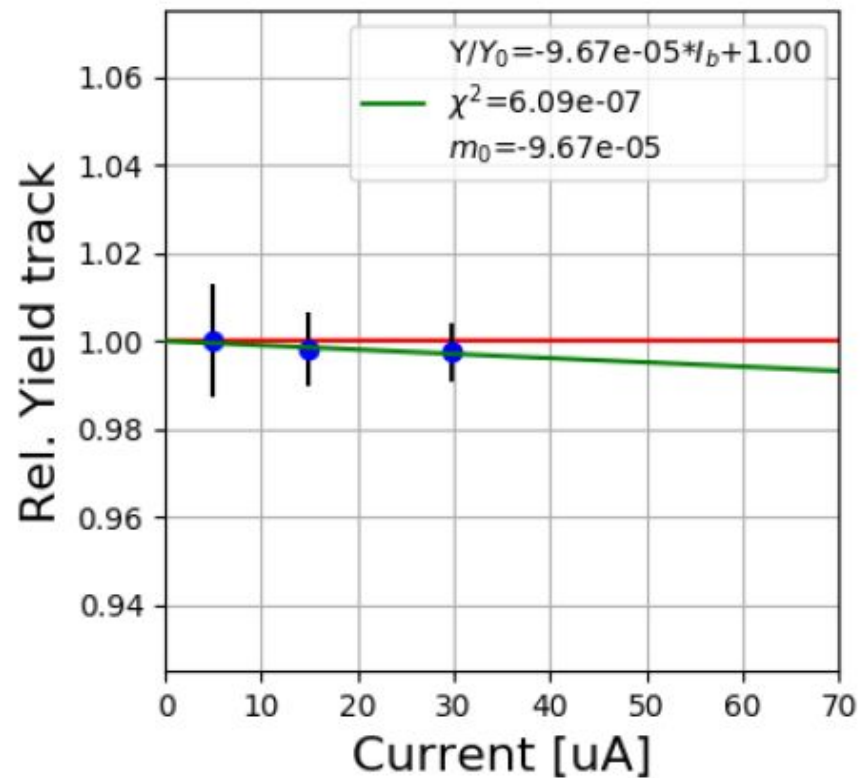
10.6 Lumi Run #2

- P_SHMS = +6.053, Theta_SHMS = 6.495
- P_HMS = -4.204, Theta_HMS = 14.930

HMS Carbon 5178-5181

$Y/Y_0 = -9.67e\text{-}05*I_b + 1.00$

$\chi^2 = 6.09e\text{-}07$

$m_0 = -9.67e\text{-}05$

Rel. Yield track

Current [uA]

HMS LH2 5167-5303

$Y/Y_0 = 6.08e\text{-}04*I_b + 1.00$

$\chi^2 = 1.66e\text{-}04$

$m_0 = 6.08e\text{-}04$

Rel. Yield track

Current [uA]
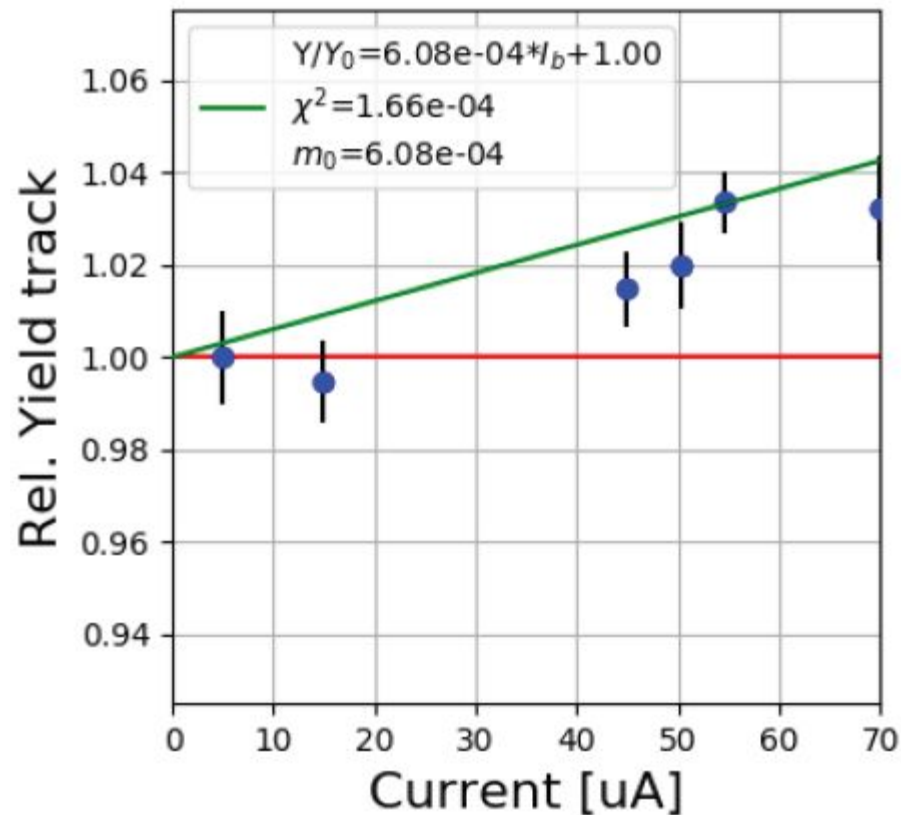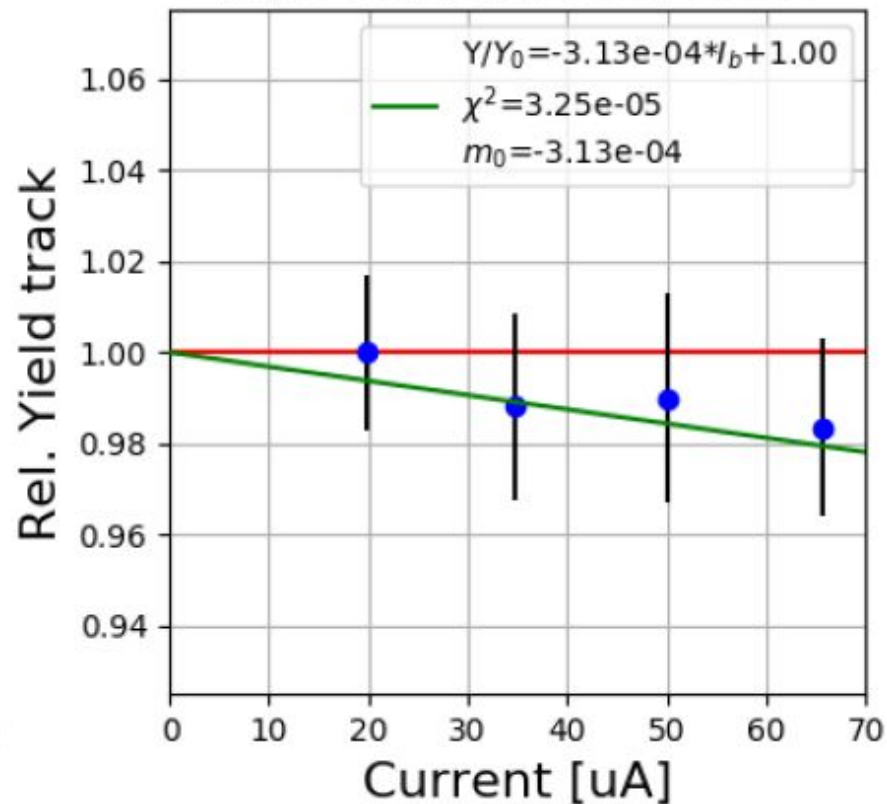
10.6 Lumi Run #3

- P_SHMS = -6.269, Theta_SHMS = 13.500
- P_HMS = -3.09, Theta_SHMS = 35.010

HMS Carbon 5351-5358

$Y/Y_0=-3.13e-04*I_b+1.00$
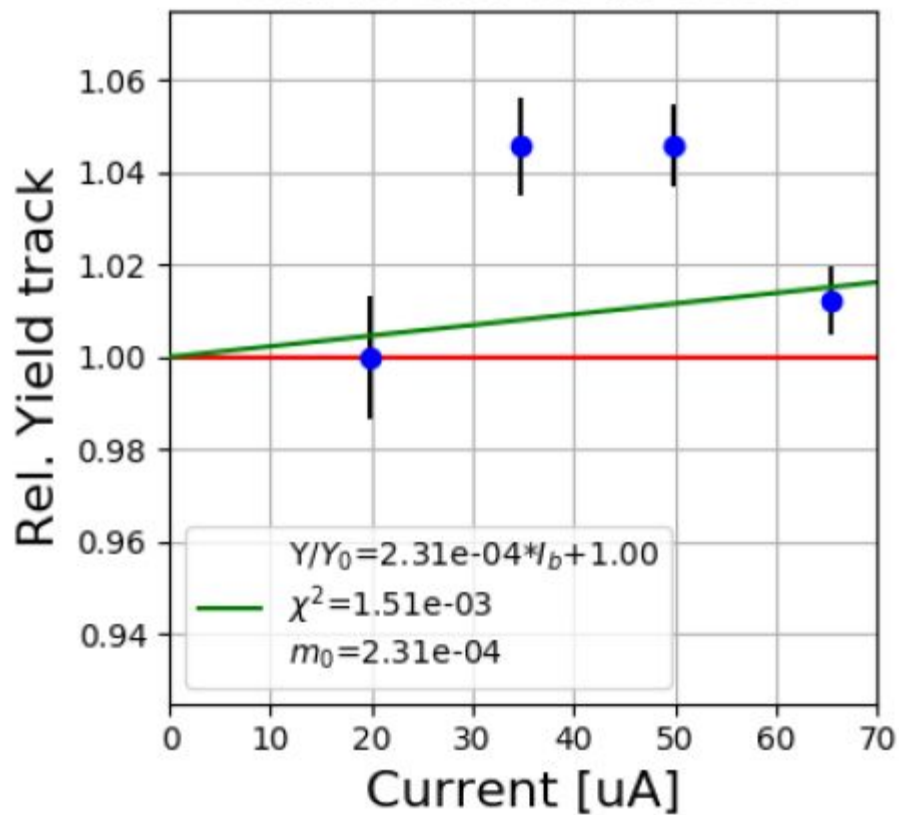
$\chi^2=3.25e-05$

$m_0=-3.13e-04$

HMS LH2 5342-5350

$Y/Y_0=-9.42e-04*I_b+1.00$

$\chi^2=5.29e-04$

$m_0=-9.42e-04$

Rel. Yield track

Current [uA]

SHMS Carbon 5351-5358

$Y/Y_0 = -2.00e{-}04 * I_b + 1.00$

$\chi^2 = 9.24e{-}05$

$m_0 = -2.00e{-}04$

SHMS LH2 5342-5350

$Y/Y_0 = 2.31e{-}04 * I_b + 1.00$

$\chi^2 = 1.51e{-}03$

$m_0 = 2.31e{-}04$

Rel. Yield track

Current [uA]
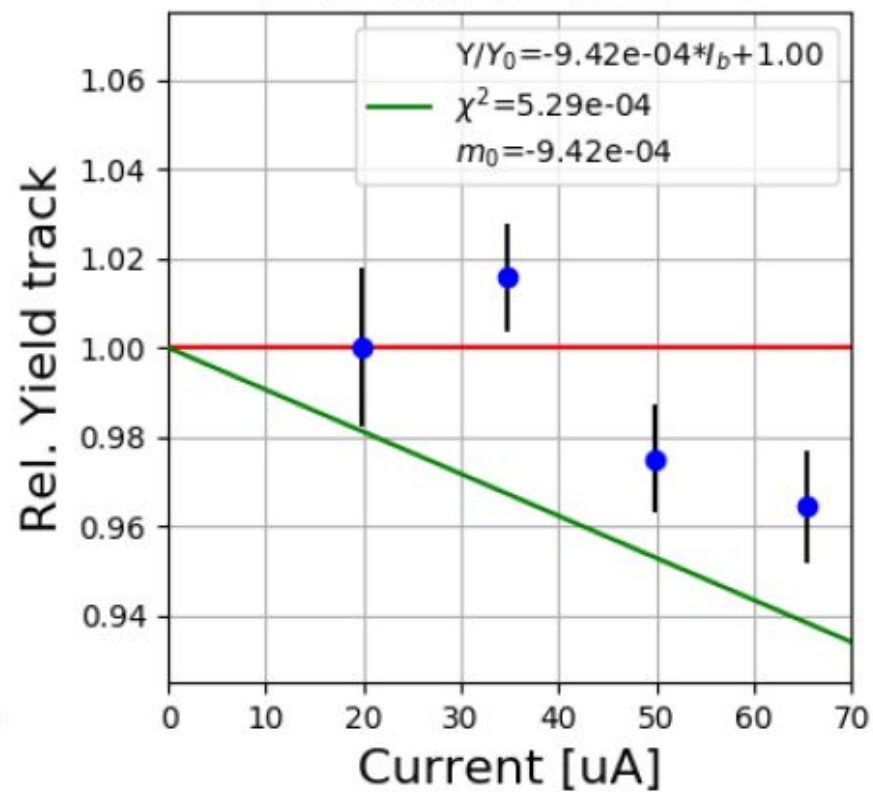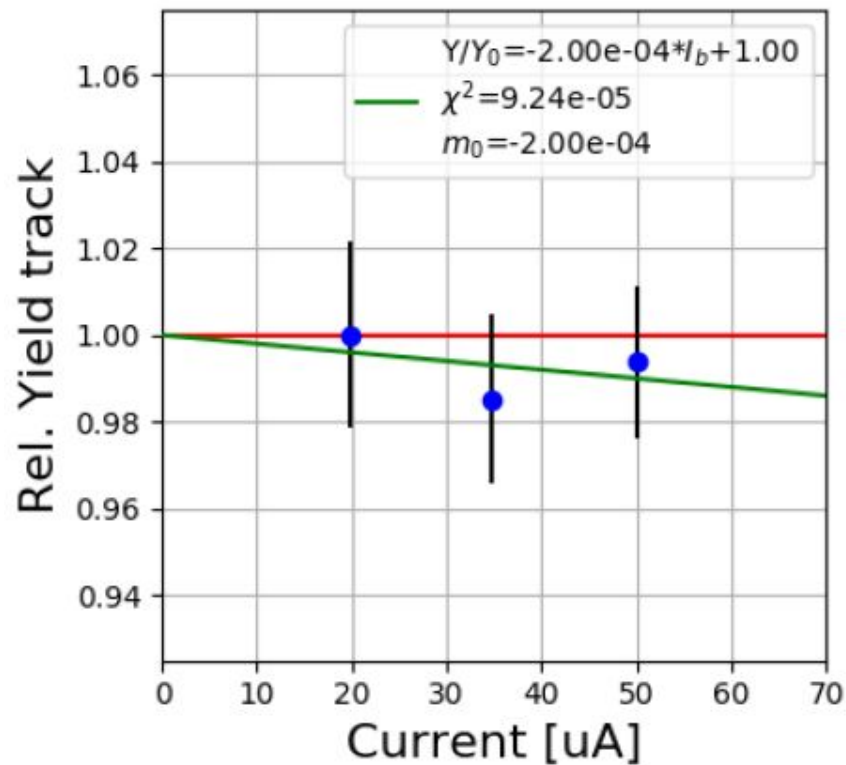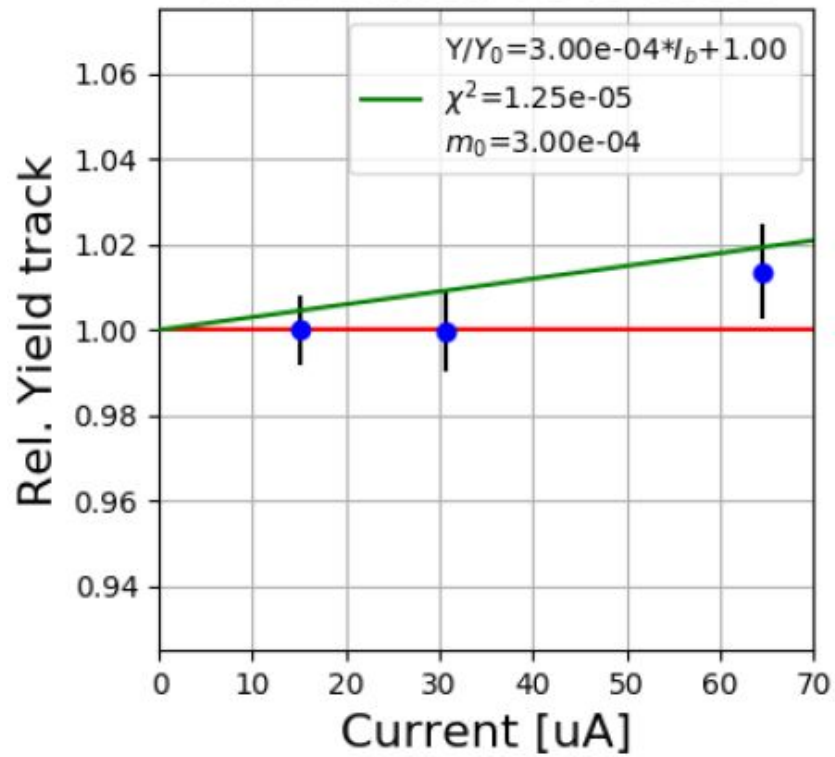
8.2 Lumi Run #1

- P_SHMS = -5.745, Theta_SHMS = 3.510
- P_HMS = -5.745, Theta_SHMS = 12.970

HMS Carbon 7948-7951

$Y/Y_0 = 3.00e\text{-}04 * I_b + 1.00$
$\chi^2 = 1.25e\text{-}05$
$m_0 = 3.00e\text{-}04$

HMS LH2 7954-7960

$Y/Y_0 = -6.74e\text{-}04 * I_b + 1.00$
$\chi^2 = 1.72e\text{-}04$
$m_0 = -6.74e\text{-}04$

SHMS Carbon 7948-7951

Rel. Yield track vs Current [uA]

$Y/Y_0 = 7.81e\text{-}04 * I_b + 1.00$
$\chi^2 = 3.18e\text{-}08$
$m_0 = 7.81e\text{-}04$

SHMS LH2 7954-7960

Rel. Yield track vs Current [uA]

$Y/Y_0 = -3.26e\text{-}04 * I_b + 1.00$
$\chi^2 = 2.39e\text{-}04$
$m_0 = -3.26e\text{-}04$