




# Kaon LT Status Update

November 18th, 2020

Richard Trotta


$$P_{HMS} = -3.266$$
$$\theta_{HMS} = 12.53$$

- 55 uA
  - 5149, 5150, 5152, 5154
- 45, 30, 15, 5 uA
  - 5155, 5156, 5157, 5158
- Tracking efficiency
  - (50 uA) 98, 97, 97, 97
  - 98, 99, 99, 99

$$P_{SHMS} = 6.842$$
$$\theta_{SHMS} = 6.495$$

- 55 uA
  - 5149, 5150, 5153, 5154
- 45, 30, 15, 5 uA
  - 5155, 5156, 5157, 5158
- Tracking efficiency
  - (55 uA) 95, 90, 93, 96
  - 97, 98, 98, 99

# Comparison to Carlos' scaler code

- The results of our code matches perfectly now
- The issue was the use of the SHMS scaler tree vs the HMS

```
H_hl1ACCP_scaler = s_tree.array("H.hl1ACCP.scaler")
H_hPRE40_scaler = s_tree.array("H.hPRE40.scaler")
H_hPRE100_scaler = s_tree.array("H.hPRE100.scaler")
H_hPRE150_scaler = s_tree.array("H.hPRE150.scaler")
H_hPRE200_scaler = s_tree.array("H.hPRE200.scaler")
H_pPRE40_scaler = s_tree.array("H.pPRE40.scaler")
H_pPRE100_scaler = s_tree.array("H.pPRE100.scaler")
H_pPRE150_scaler = s_tree.array("H.pPRE150.scaler")
H_pPRE200_scaler = s_tree.array("H.pPRE200.scaler")
```

```
H_hEL_LO_LO_scaler = s_tree.array("H.hEL_LO_LO.scaler")
H_hEL_LO_scaler = s_tree.array("H.hEL_LO.scaler")
H_hEL_HI_scaler = s_tree.array("H.hEL_HI.scaler")
H_hEL_REAL_scaler = s_tree.array("H.hEL_REAL.scaler")
H_hEL_CLEAN_scaler = s_tree.array("H.hEL_CLEAN.scaler")
H_hSTOF_scaler = s_tree.array("H.hSTOF.scaler")
```

```
H_pEL_LO_LO_scaler = s_tree.array("H.pEL_LO_LO.scaler")
H_pEL_LO_scaler = s_tree.array("H.pEL_LO.scaler")
H_pEL_HI_scaler = s_tree.array("H.pEL_HI.scaler")
H_pEL_REAL_scaler = s_tree.array("H.pEL_REAL.scaler")
H_pEL_CLEAN_scaler = s_tree.array("H.pEL_CLEAN.scaler")
H_pSTOF_scaler = s_tree.array("H.pSTOF.scaler")
H_pPRHI_scaler = s_tree.array("H.PRHI.scaler")
H_pPRLO_scaler = s_tree.array("H.PRLO.scaler")
```

```
H_EDTM_scaler = s_tree.array("H.EDTM.scaler")
```

```
P_pl1ACCP_scaler = s_tree.array("P.pl1ACCP.scaler")
P_pPRE40_scaler = s_tree.array("P.pPRE40.scaler")
P_pPRE100_scaler = s_tree.array("P.pPRE100.scaler")
P_pPRE150_scaler = s_tree.array("P.pPRE150.scaler")
P_pPRE200_scaler = s_tree.array("P.pPRE200.scaler")
P_pPRE40_scaler = s_tree.array("P.pPRE40.scaler")
P_pPRE100_scaler = s_tree.array("P.pPRE100.scaler")
P_pPRE150_scaler = s_tree.array("P.pPRE150.scaler")
P_pPRE200_scaler = s_tree.array("P.pPRE200.scaler")
```

```
P_pEL_LO_LO_scaler = s_tree.array("P.pEL_LO_LO.scaler")
P_pEL_LO_scaler = s_tree.array("P.pEL_LO.scaler")
P_pEL_HI_scaler = s_tree.array("P.pEL_HI.scaler")
P_pEL_REAL_scaler = s_tree.array("P.pEL_REAL.scaler")
P_pEL_CLEAN_scaler = s_tree.array("P.pEL_CLEAN.scaler")
P_pSTOF_scaler = s_tree.array("P.pSTOF.scaler")
```

```
P_pEL_LO_LO_scaler = s_tree.array("P.pEL_LO_LO.scaler")
P_pEL_LO_scaler = s_tree.array("P.pEL_LO.scaler")
P_pEL_HI_scaler = s_tree.array("P.pEL_HI.scaler")
P_pEL_REAL_scaler = s_tree.array("P.pEL_REAL.scaler")
P_pEL_CLEAN_scaler = s_tree.array("P.pEL_CLEAN.scaler")
P_pSTOF_scaler = s_tree.array("P.pSTOF.scaler")
P_pPRHI_scaler = s_tree.array("P.PRHI.scaler")
P_pPRLO_scaler = s_tree.array("P.PRLO.scaler")
```

```
P_EDTM_scaler = s_tree.array("P.EDTM.scaler")
```

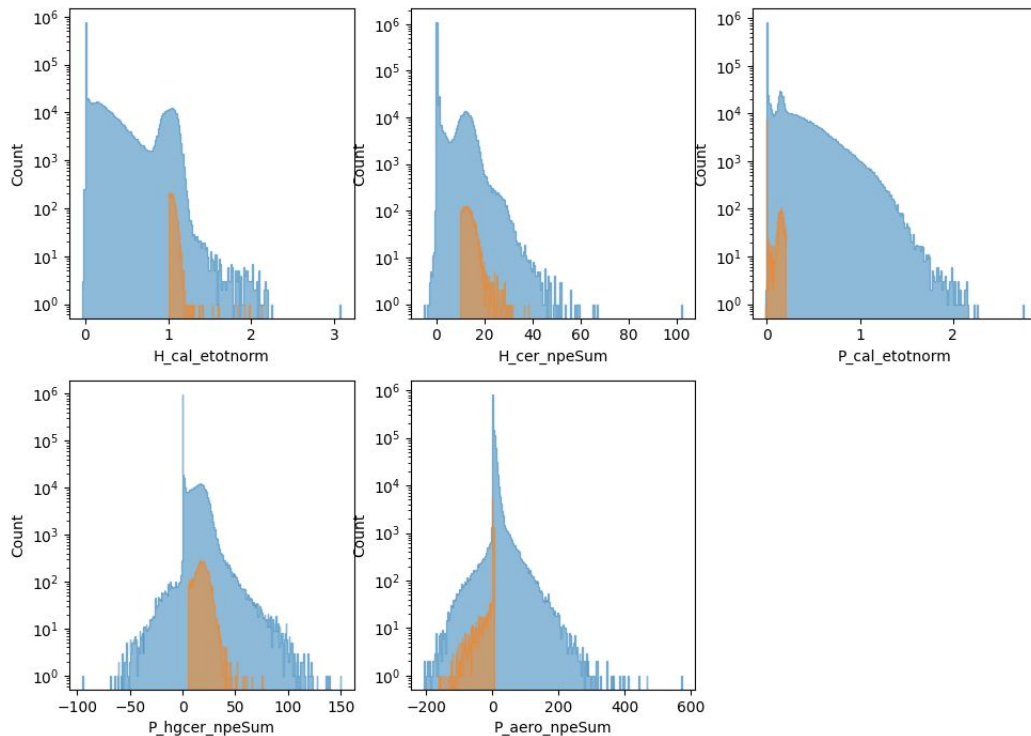
# Cuts



- $\text{abs}(\text{I-SetCurrent}) < |2.5|\mu\text{A}$
- Delta
  - HMS,  $(-8 < \text{delta} < 8)$
  - SHMS,  $(-10 < \text{delta} < 20)$
- start time
  - $\text{H(P).hod.goodstarttime} == 1$

Electron  
Cer > 10.0  
Cal > 1.0

Proton  
Hgcer > 5.0  
Aero < 5.0  
Cal < 0.2



# Equations

$$N_{scaler} = \Sigma(trigscaler) \quad Q_{tot} = (H.BCM.scaler.charge)$$

- Scaler

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

$$N_{electrons} = \int (H/P.hod.goodscinhits)$$

- No track

$$Y_{notrack} = \frac{PS * N_{electrons}}{Q_{tot} \epsilon_{cpuLT}}$$

$$Y_{notrack} = \frac{N_{electrons}}{Q_{tot} \epsilon_{cpuLT}}$$

$$cpuLT = \frac{EvtType}{TRIG_{accept} - edtm}$$

$$cpuLT = \frac{EvtType}{\frac{TRIG_{accept}}{PS} - edtm}$$

- Track

$$Y_{track} = \frac{PS * N_{track}}{Q_{tot} \epsilon_{track} \epsilon_{cpuLT}}$$

$$Y_{track} = \frac{N_{track}}{Q_{tot} \epsilon_{track} \epsilon_{cpuLT}}$$

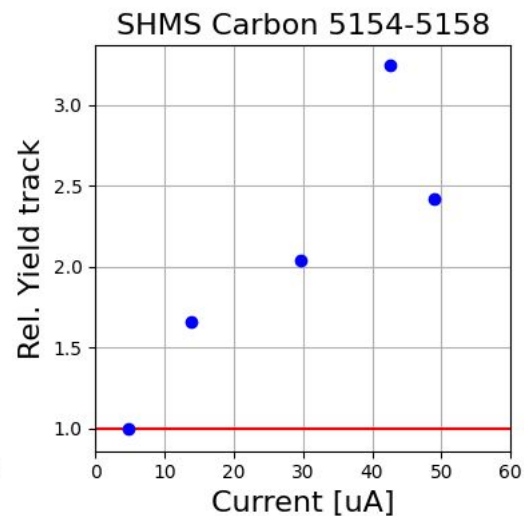
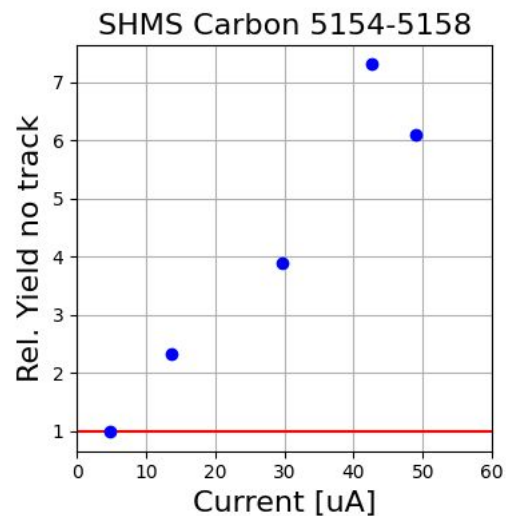
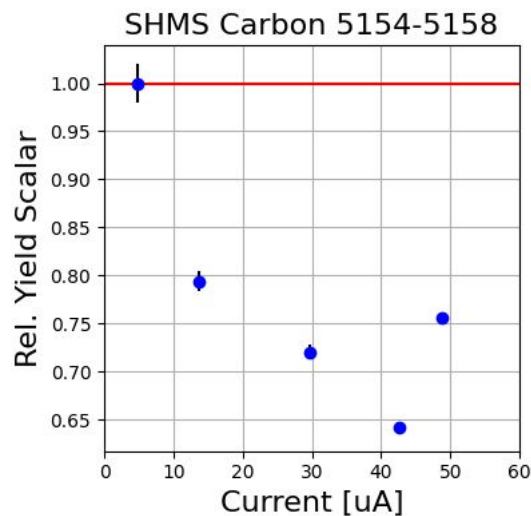
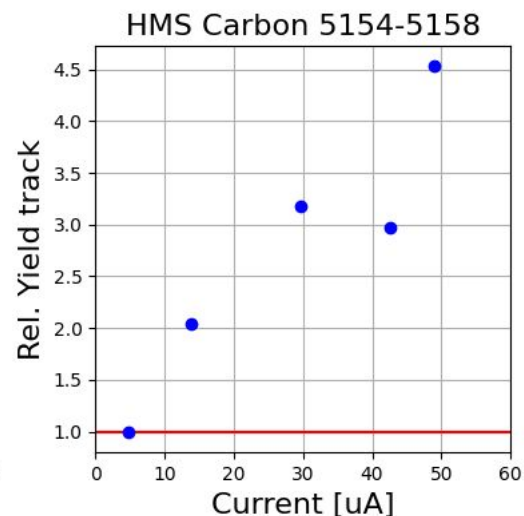
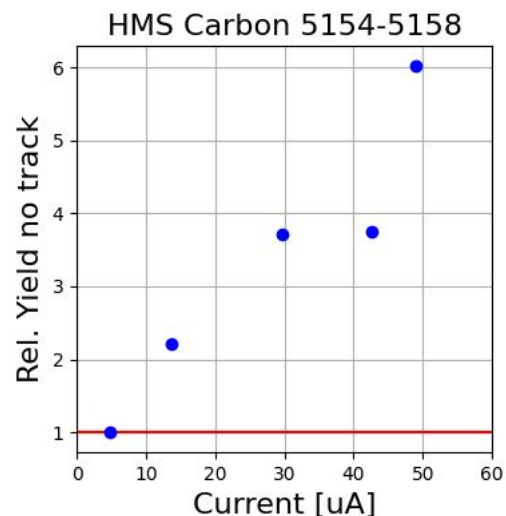
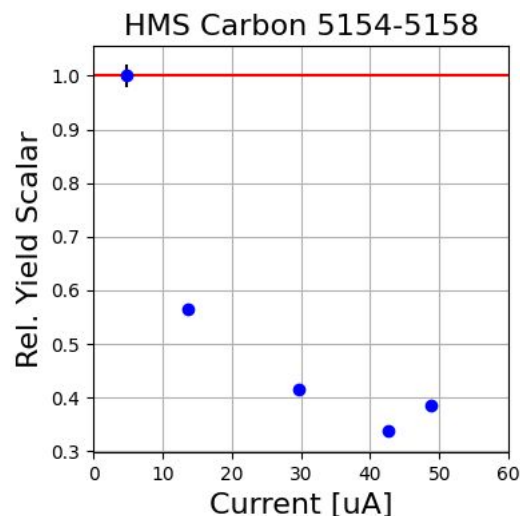
$$N_{track} = tracks$$

$$P_{HMS} = -3.266$$

**\*\*Plots from last meeting\*\***

Before CPULT  
and PS fix (No PID  
Cuts)

$$P_{SHMS} = 6.842$$

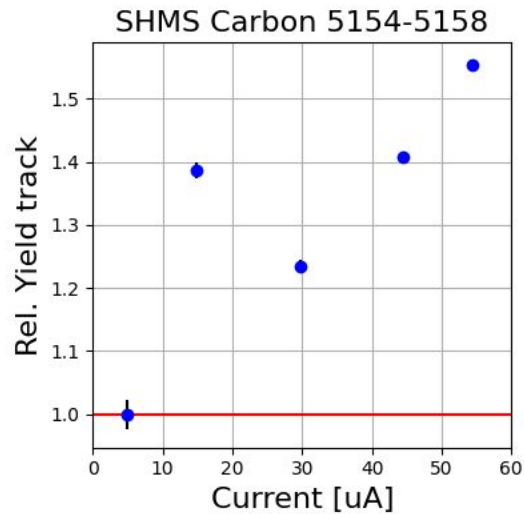
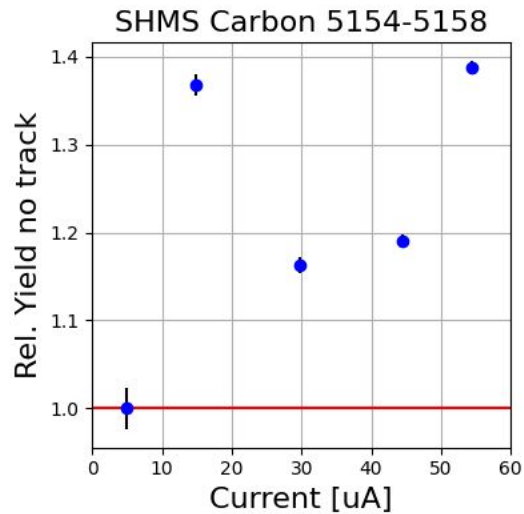
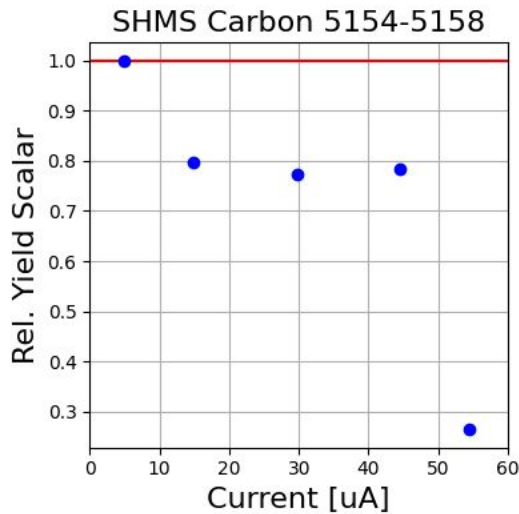
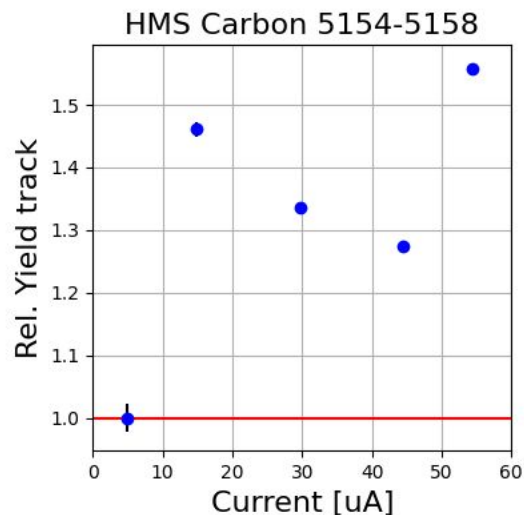
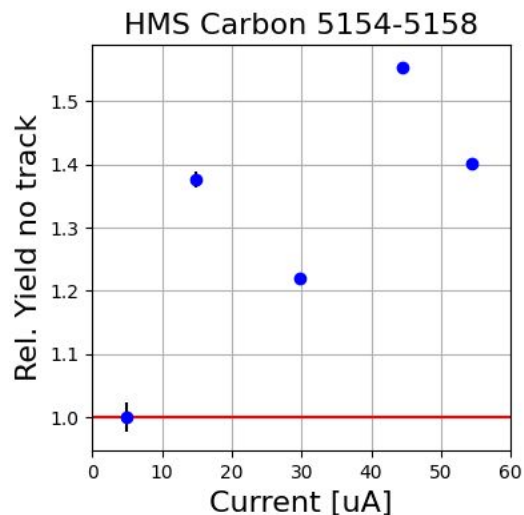
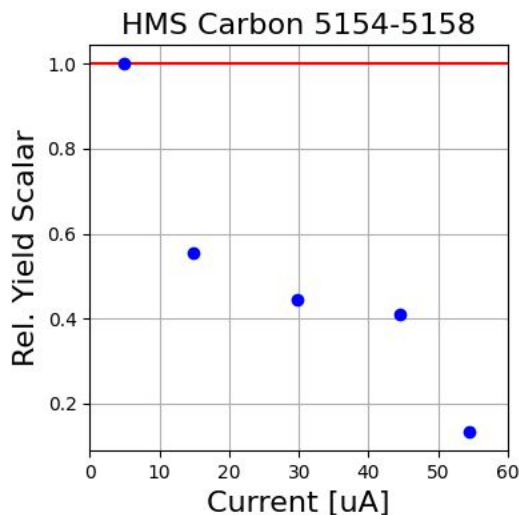


$$P_{HMS} = -3.266$$



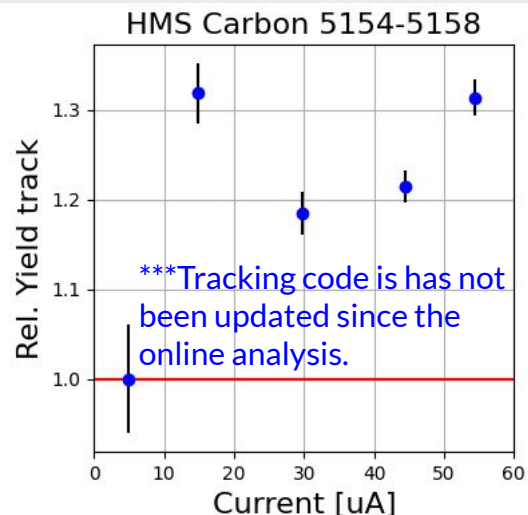
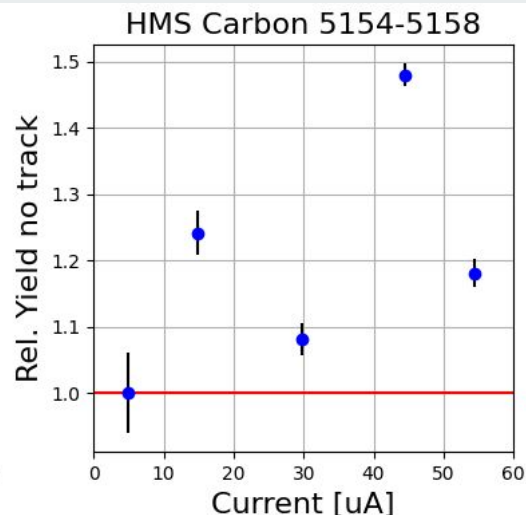
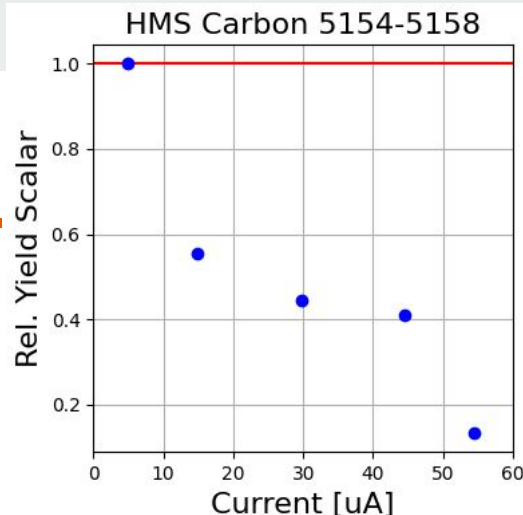
CPU fix applied  
Before PS fix (No  
PID Cuts)

$$P_{SHMS} = 6.842$$



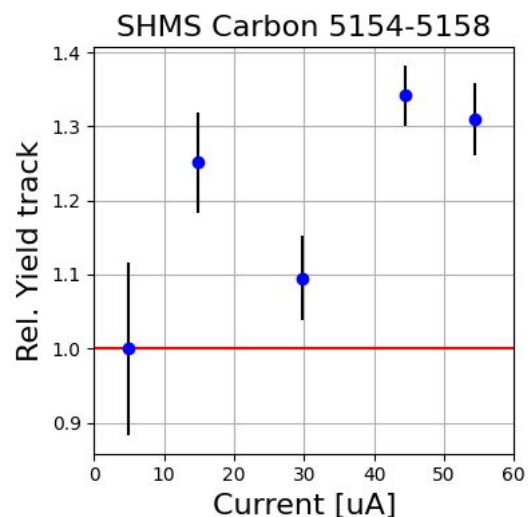
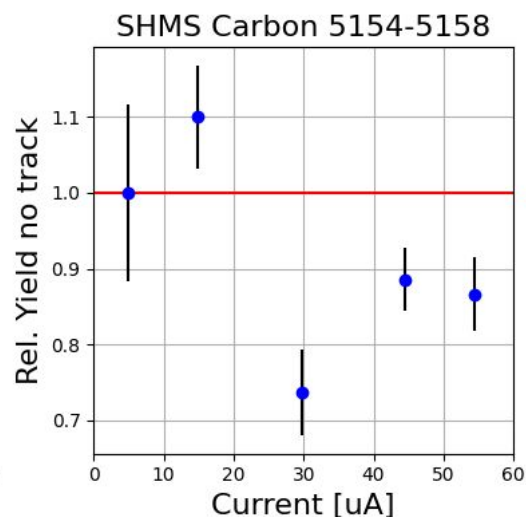
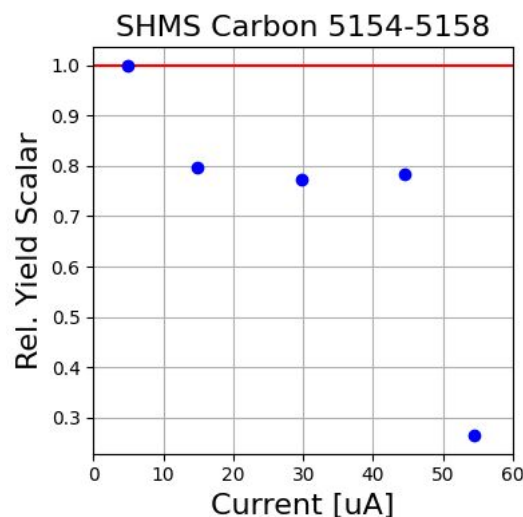
$$P_{HMS} = -3.266$$

Electron  
 Cer > 10.0  
 Cal > 1.0



$$P_{SHMS} = 6.842$$

Proton  
 Hgcer > 5.0  
 Aero < 5.0  
 Cal < 0.2





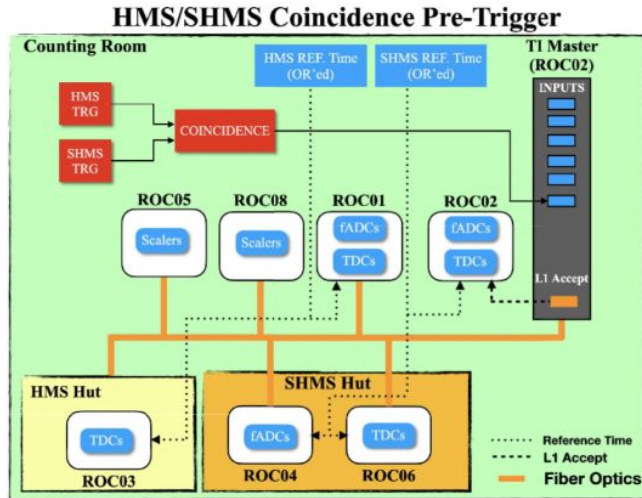
# EDTM

$$cpuLT = \frac{EvtType}{\frac{TRIG_{accept}}{PS} - edm}$$

Total EDTM

$$T_{TDT} \equiv 1 - T_{TLT} = 1 - \frac{N_{edtm,acc}}{N_{edtm,scl}}$$

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

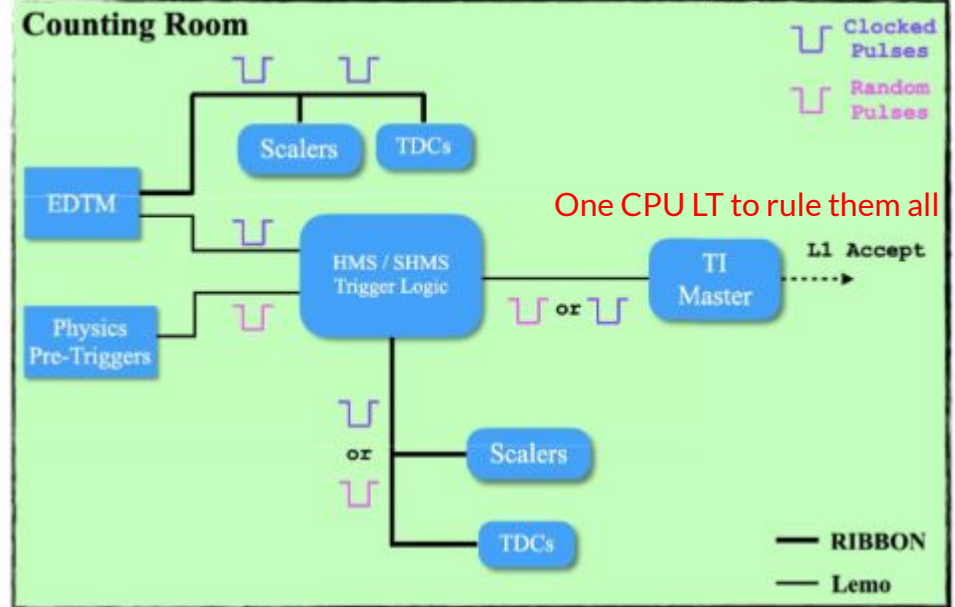


CPULT

$$T_{CLT} = \frac{N_{phy,acc}}{N_{phy,scl}}$$

$$T_{CLT} = \frac{numOfAccPhysTrigForNonzeroTDChit}{numOfPhysScalerCounts}$$

## Electronics Dead Time Monitoring (EDTM)





**Extra**

$$P_{HMS} = -3.266$$

Electron

Cer > 10.0

Cal > 1.0



\*\*\*No CPULT and  
N<sub>e</sub> corrections

$$P_{SHMS} = 6.842$$

Proton

Hgcer > 5.0

Aero < 5.0

Cal < 0.7

