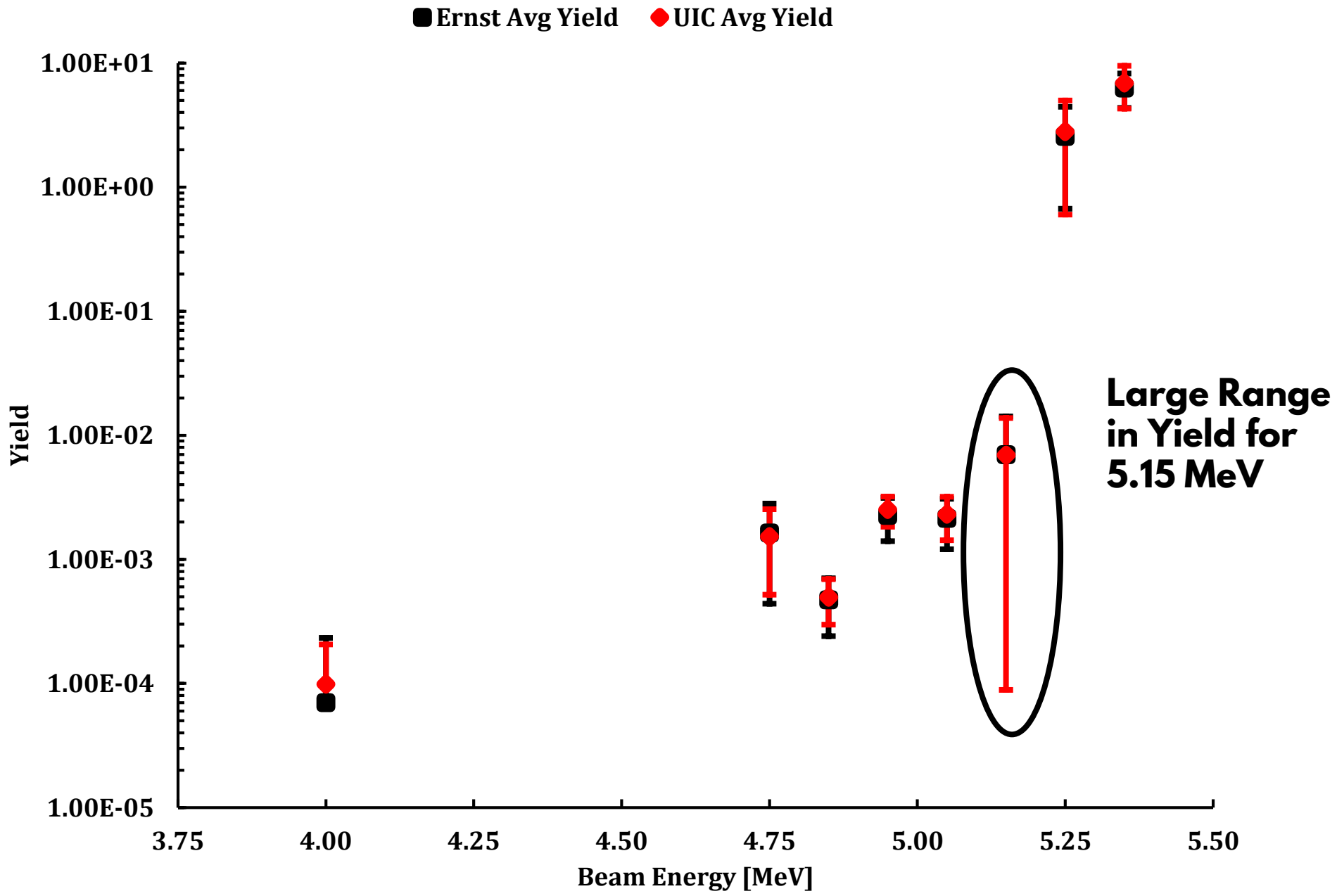
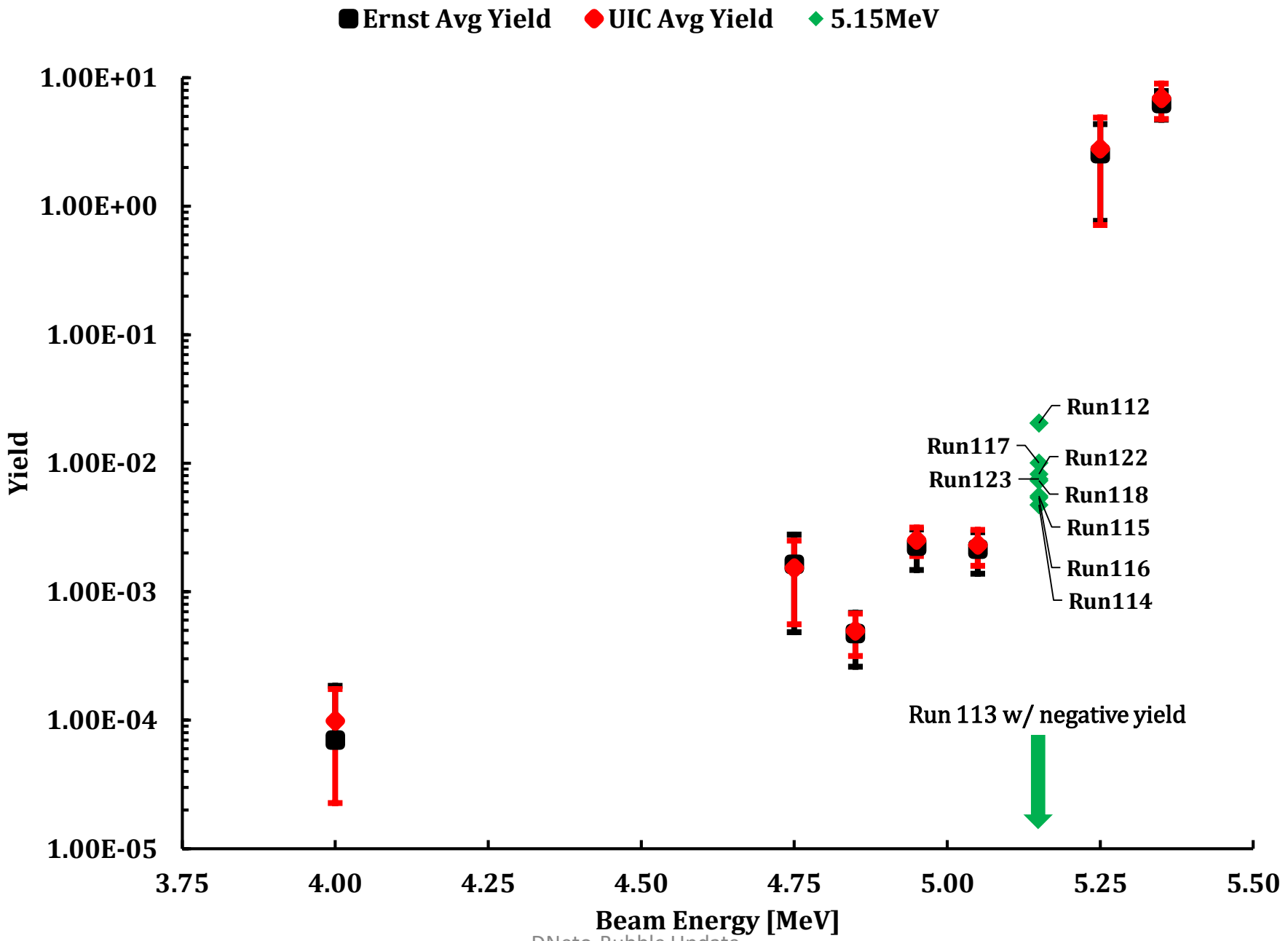
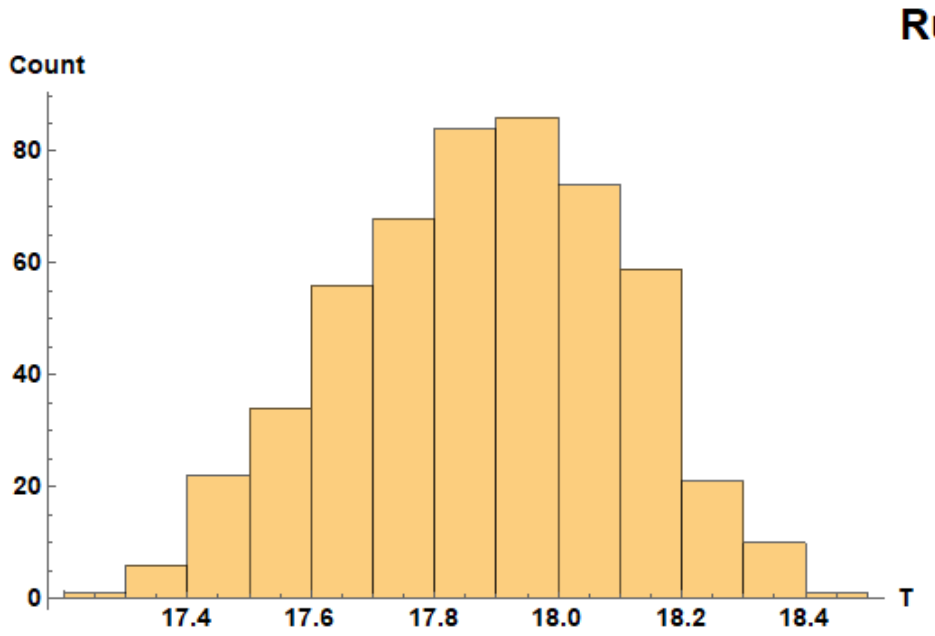
# Bubble Update 4/26/2019

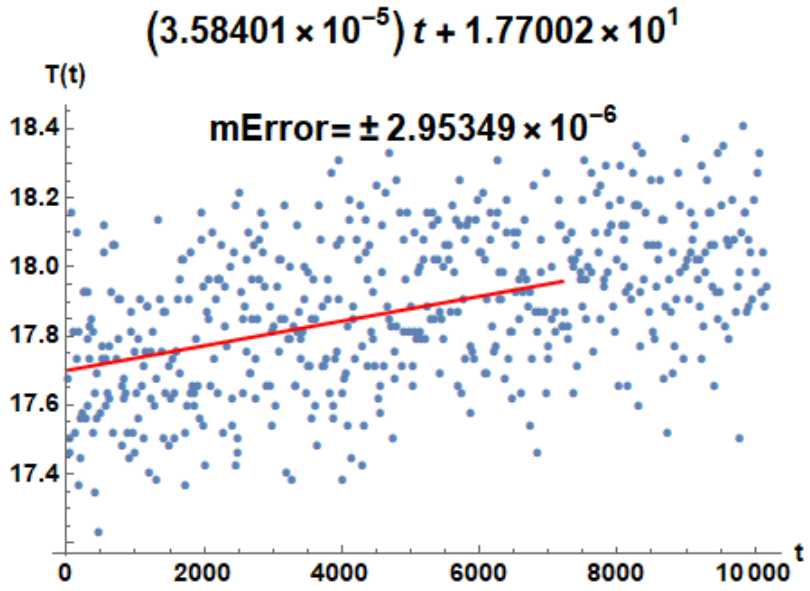
David Neto

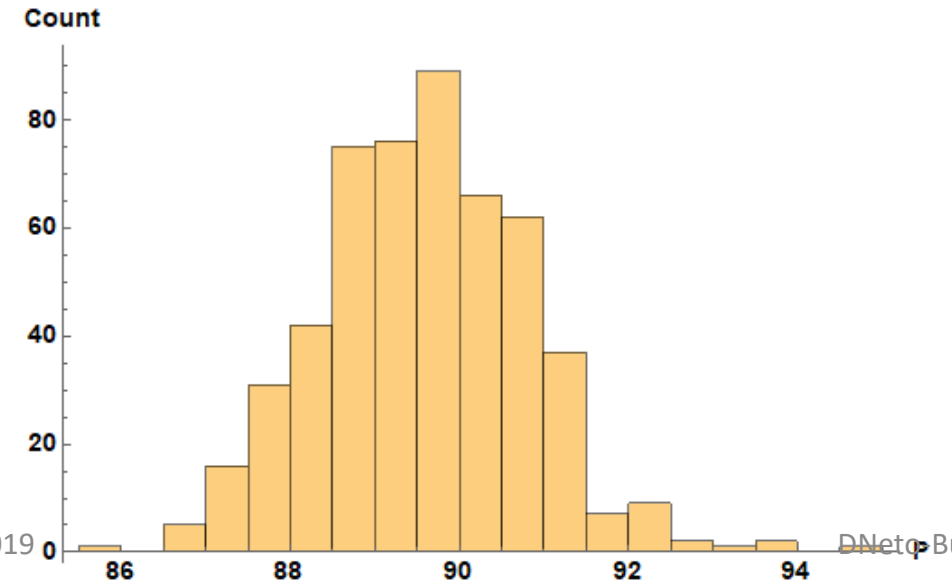

Ernst Avg Yield
UIC Avg Yield
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
Yield
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
Beam Energy [MeV]
Large Range in Yield for 5.15 MeV

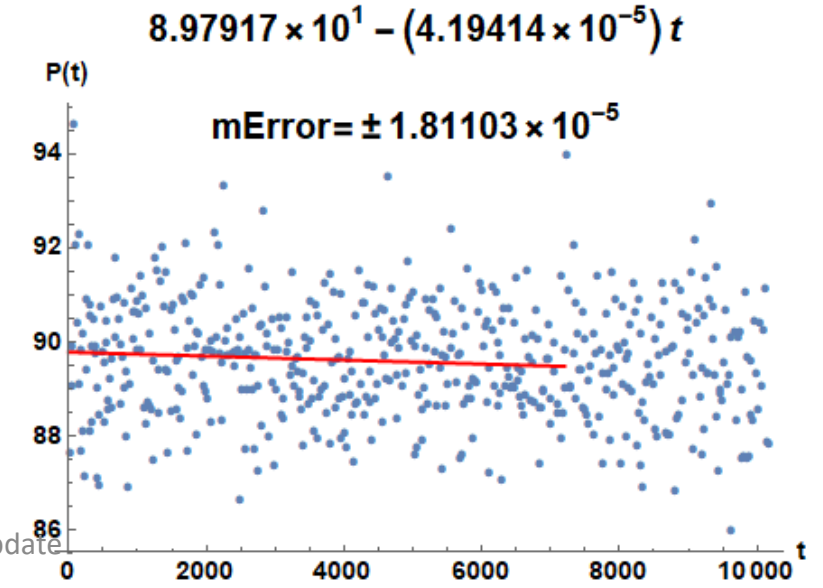

Ernst Avg Yield
UIC Avg Yield
5.15MeV
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
Yield
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
Beam Energy [MeV]
Run112
Run117
Run122
Run123
Run118
Run115
Run116
Run114
Run 113 w/ negative yield

# Quick Aside 5.05 MeV Run 64 (OLD)

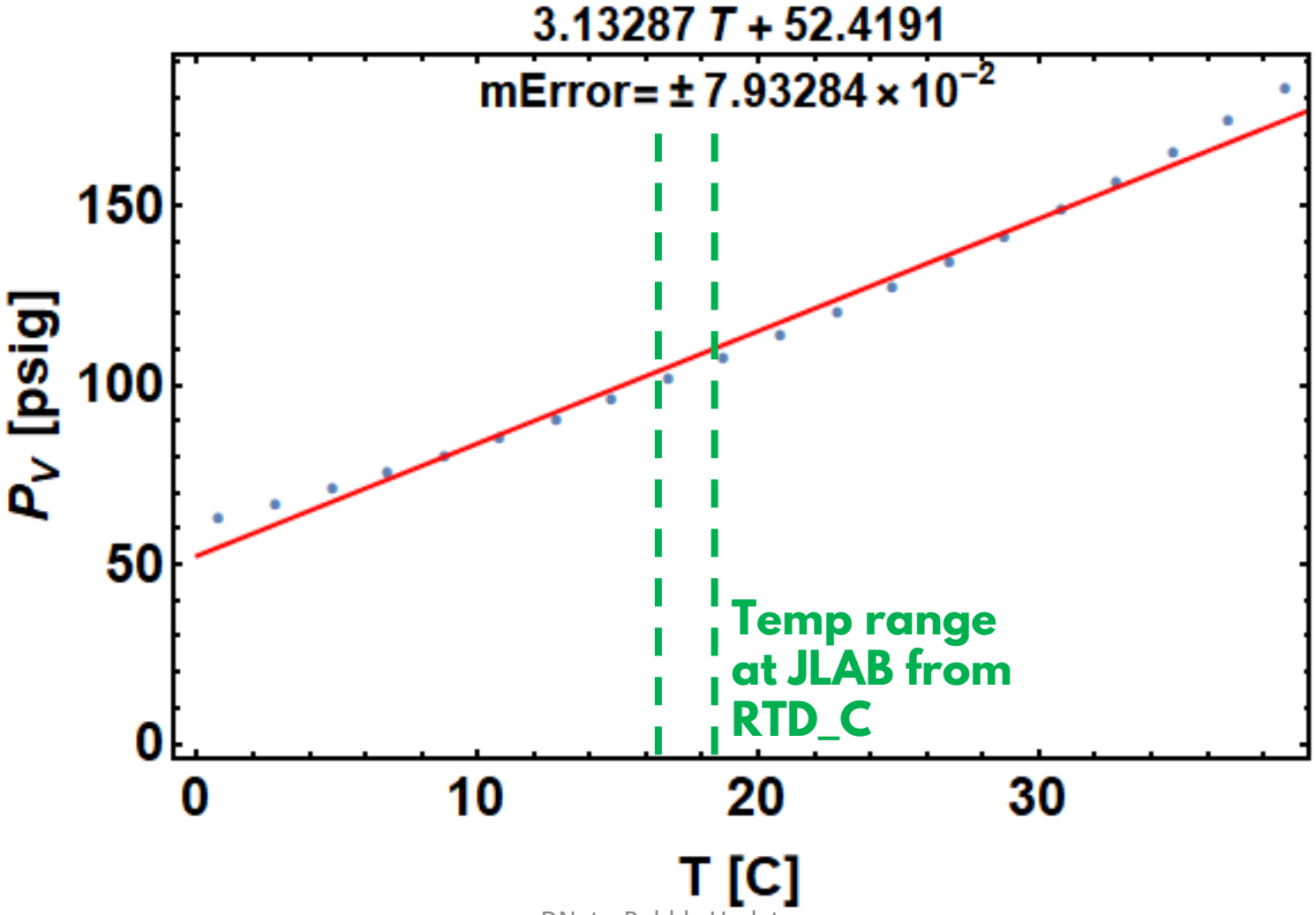


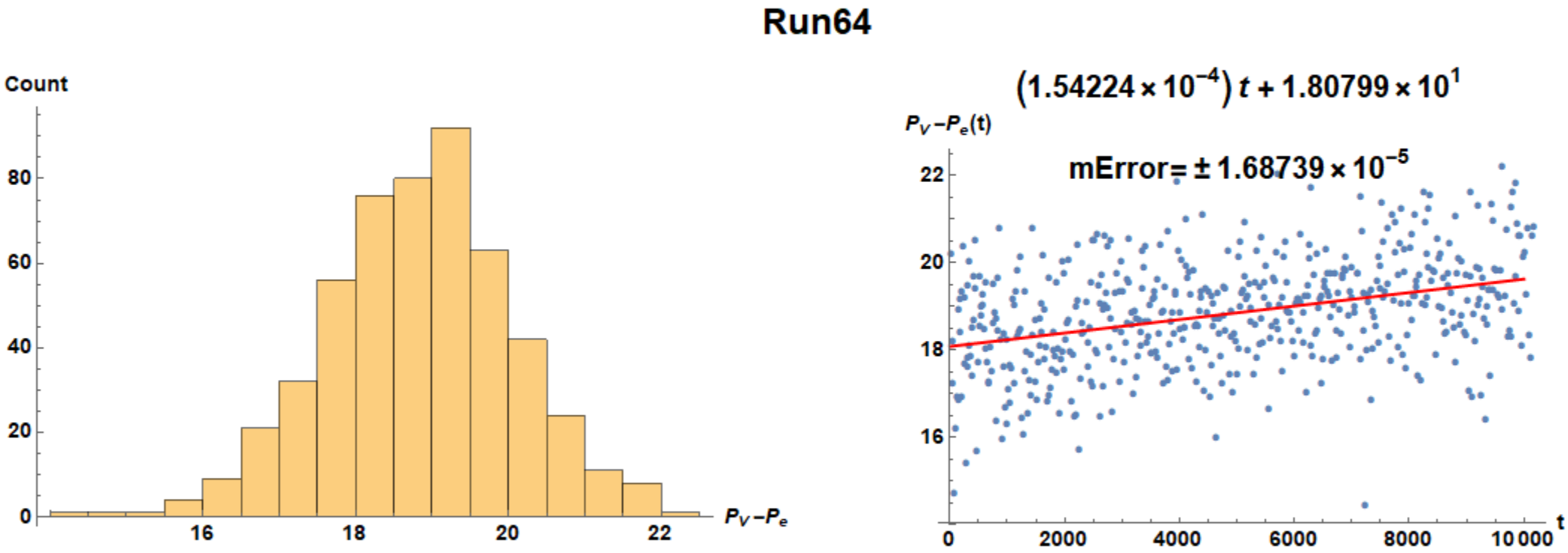



# Lets look at degree of superheat $\Delta P = P_V - P_e$

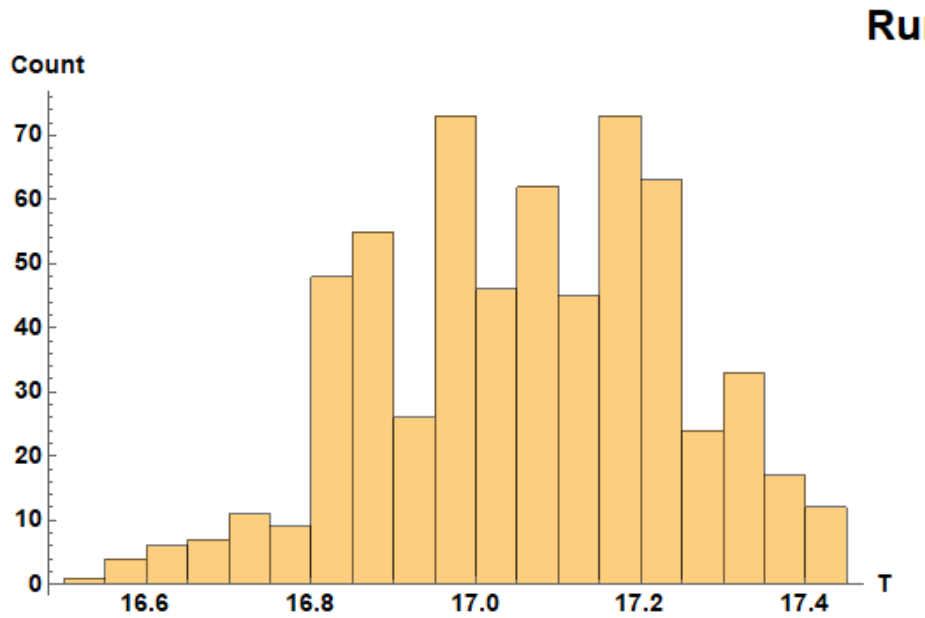


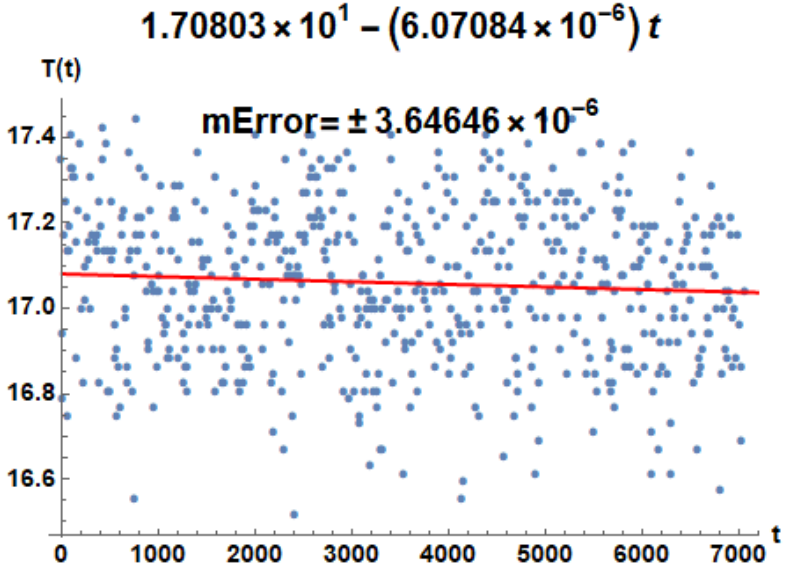

**Vapor pressure as function of temperature from 3M data with fit**

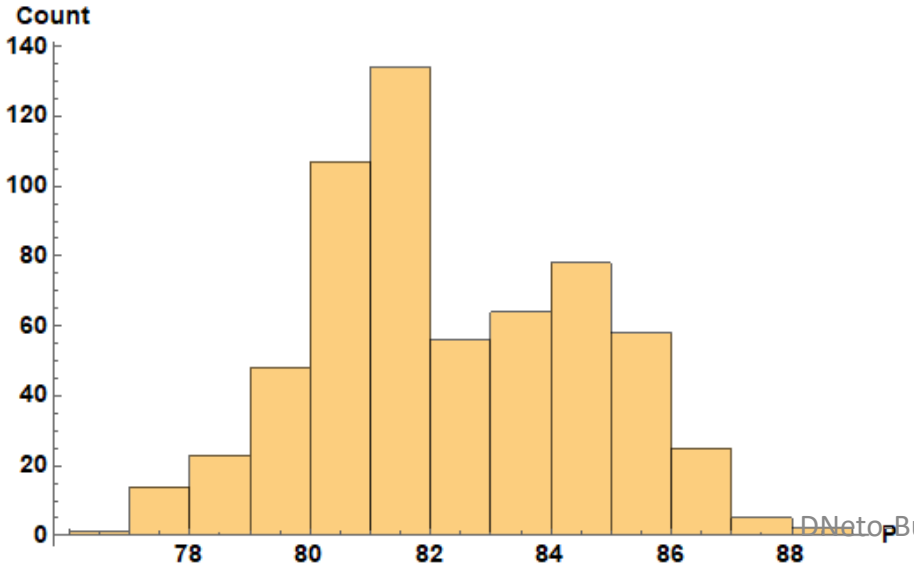
# Quick Aside 5.05 MeV Run 64 Superheat

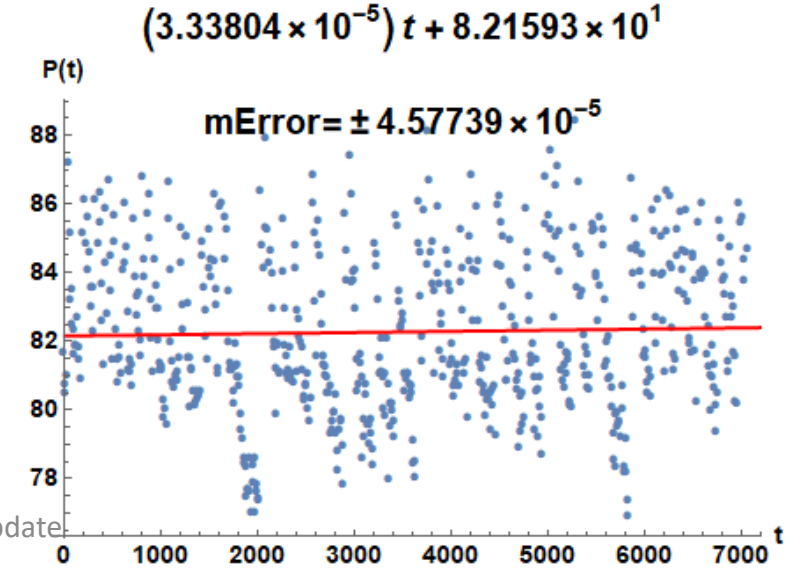


# 5.15 MeV Run 113 (Yield < 0)

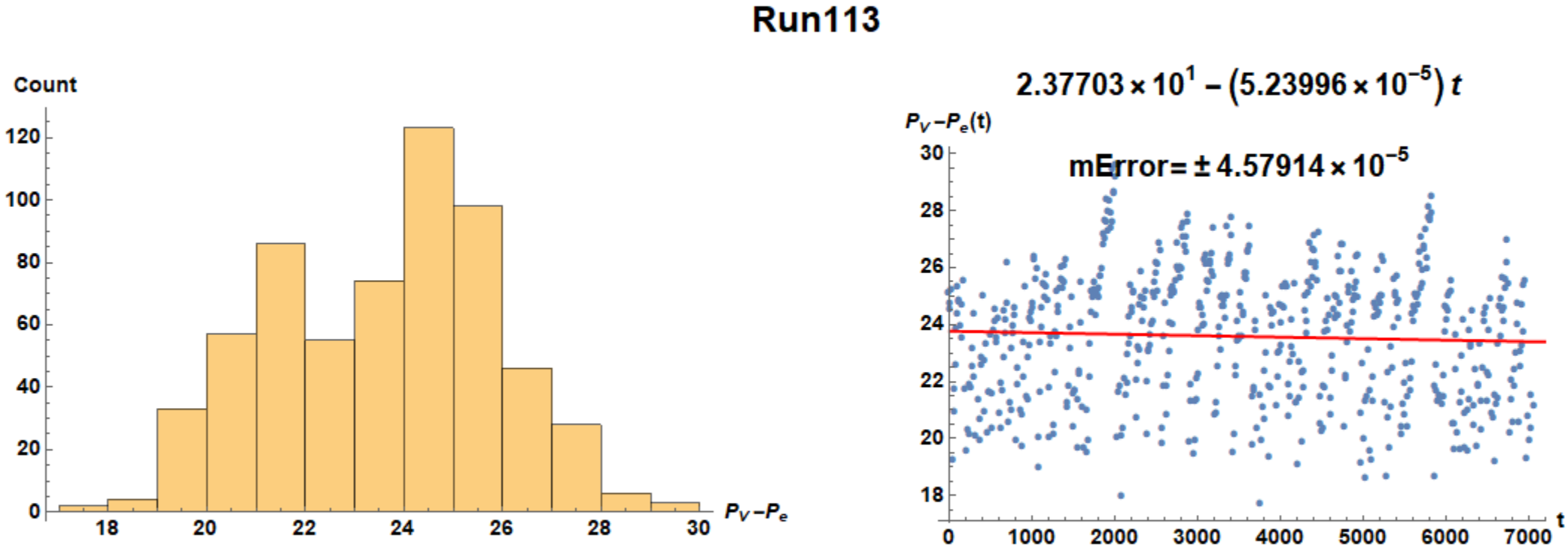


# 5.15 MeV Run 113 (Yield < 0)

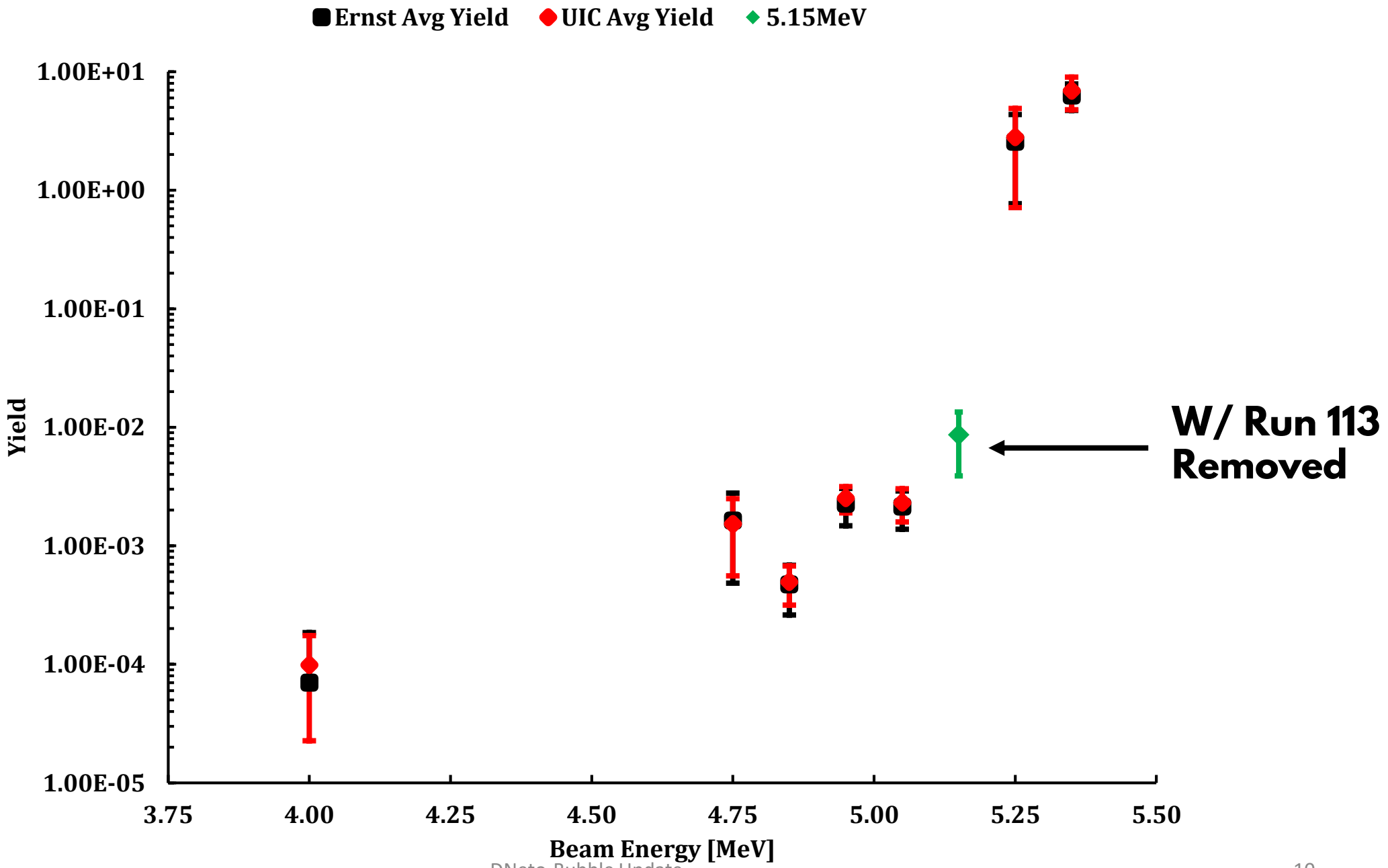


# 5.15 MeV Runs

| Run | I [uA] | Run Time [s] | AVG DegSuperheat | STDEV of DegSuperheat | Slope of DegSuperheat | Slope Error± | Yield |
|---|---|---|---|---|---|---|---|
| 112 | 0.10 | 6331 | 23.458 | 2.309 | 1.795E-4 | 5.439E-5 | 2.05E-02 |
| 113 | 0.10 | 7212 | 23.586 | 2.277 | 5.240E-5 | 4.579E-5 | -6.74E-03 |
| 114 | 2.00 | 3264 | 21.761 | 1.841 | 1.063E-4 | 1.430E-4 | 4.73E-03 |
| 115 | 2.00 | 3673 | 22.059 | 2.075 | 4.692E-4 | 1.271E-4 | 5.56E-03 |
| 116 | 2.00 | 3456 | 22.137 | 1.752 | 8.222E-5 | 1.220E-4 | 5.41E-03 |
| 117 | 3.00 | 2374 | 21.682 | 1.637 | 1.921E-4 | 2.224E-4 | 1.01E-02 |
| 118 | 2.00 | 3070 | 22.331 | 1.631 | 2.018E-4 | 1.320E-4 | 7.33E-03 |
| 122 | 2.00 | 7202 | 22.140 | 1.969 | 1.917E-4 | 6.157E-5 | 8.22E-03 |
| 123 | 2.00 | 7218 | 22.434 | 1.751 | 1.316E-4 | 4.223E-5 | 7.55E-03 |

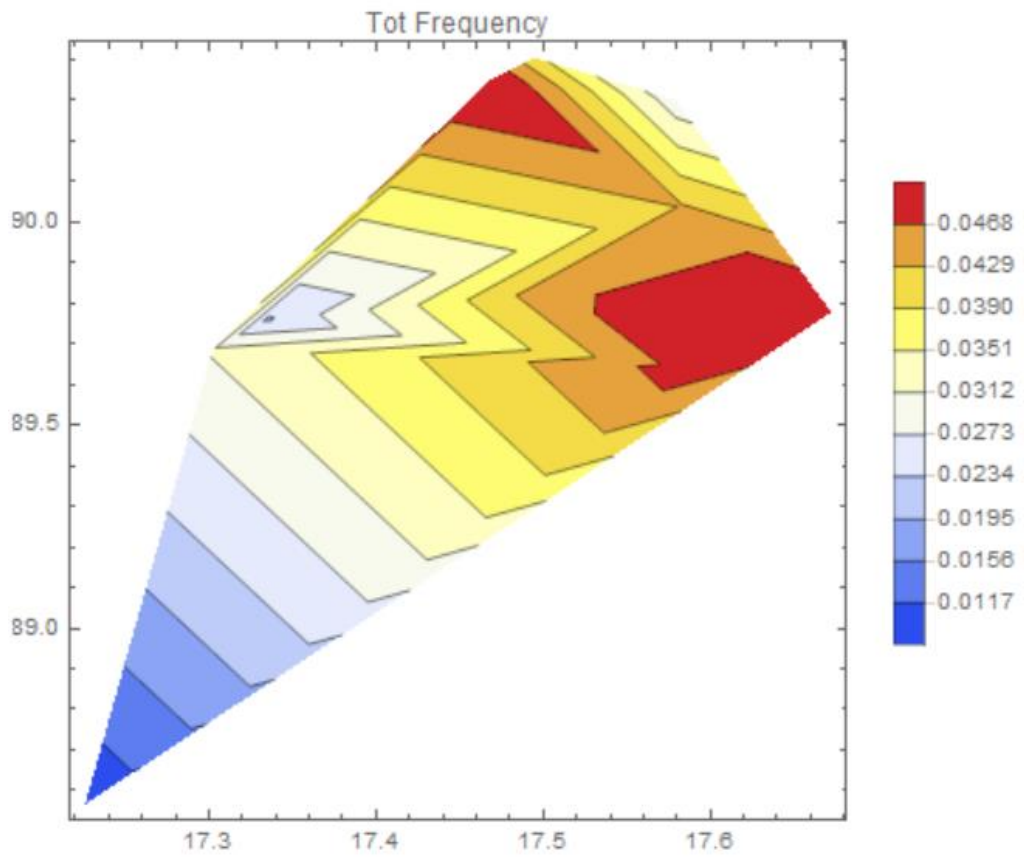
**AVG W/113** **22.399±0.642**

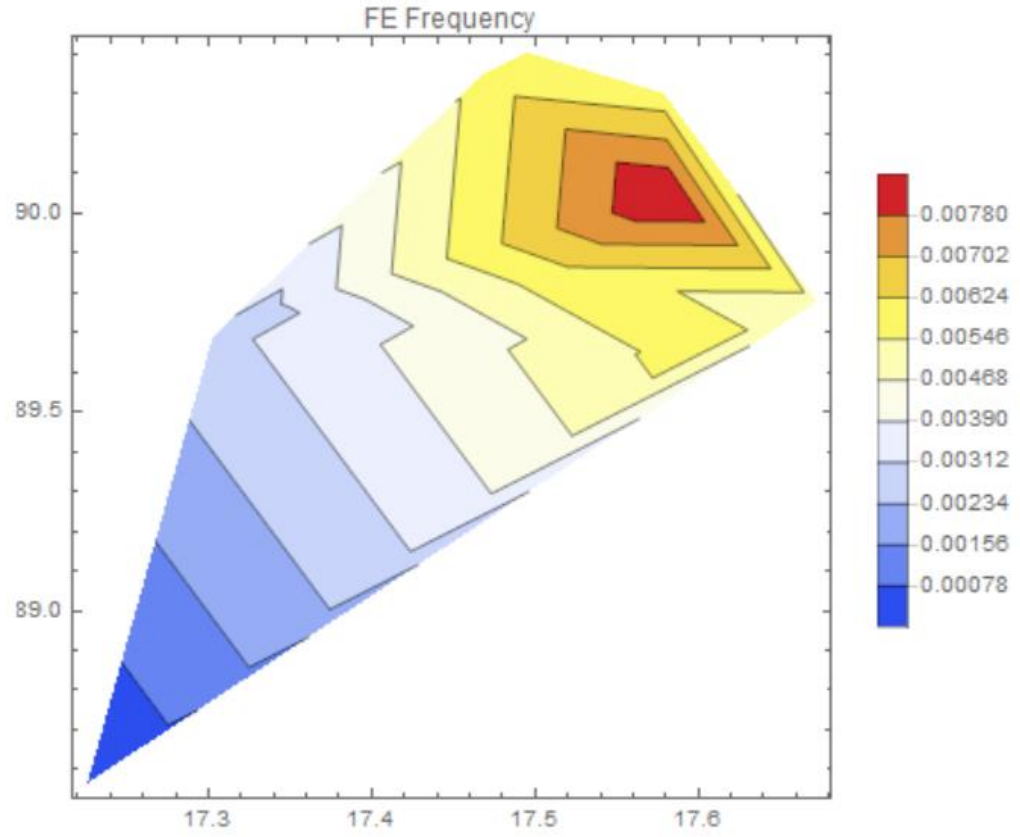
**AVG W/O 113** **22.250±0.515**


Ernst Avg Yield
UIC Avg Yield
5.15MeV
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
Yield
3.75
4.00
4.25
4.50
4.75
5.00
5.25
5.50
Beam Energy [MeV]
W/ Run 113 Removed

# One more quick thing

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **62** | TEMP SCAN | 5.05 | 8.00 | 17.5-16 | | ~1150 | 8 | Set Chiller from 14.5C to 7.5C |
| **63** | TEMP SCAN | 5.05 | 8.00 | 16-17.5 | 88 | ~3480 | 132 | Set Chiller from 7.5C to 14.5C |




**Very much work in progress**

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
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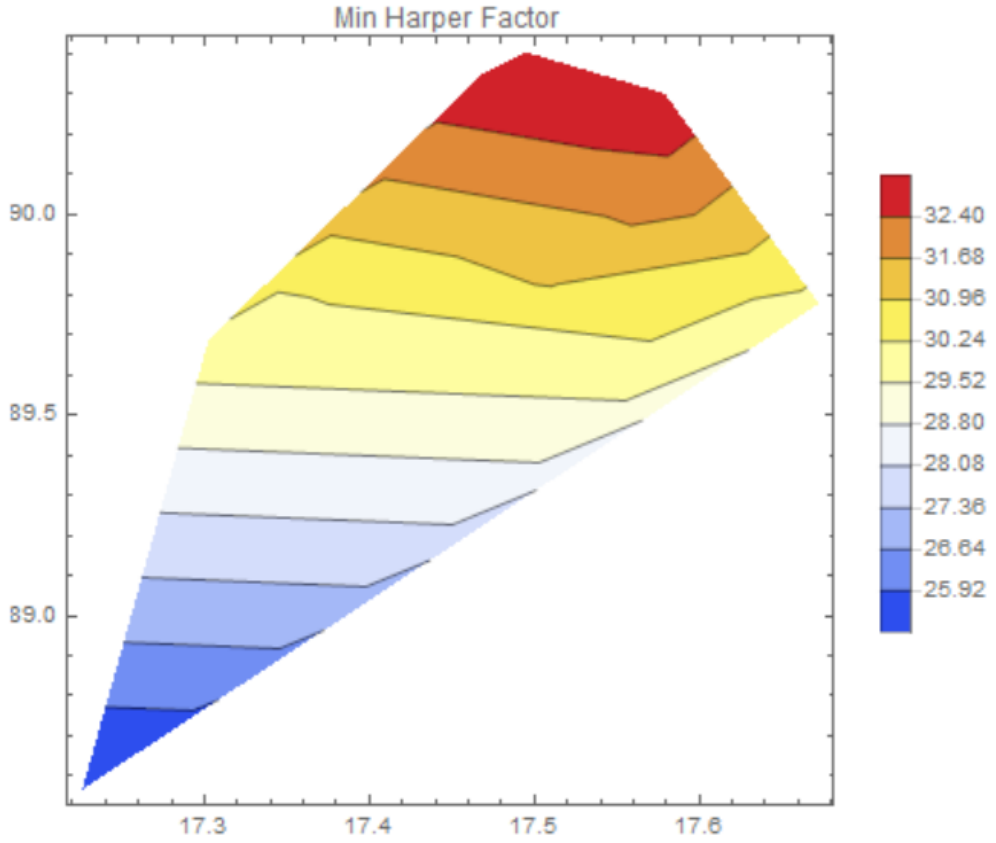


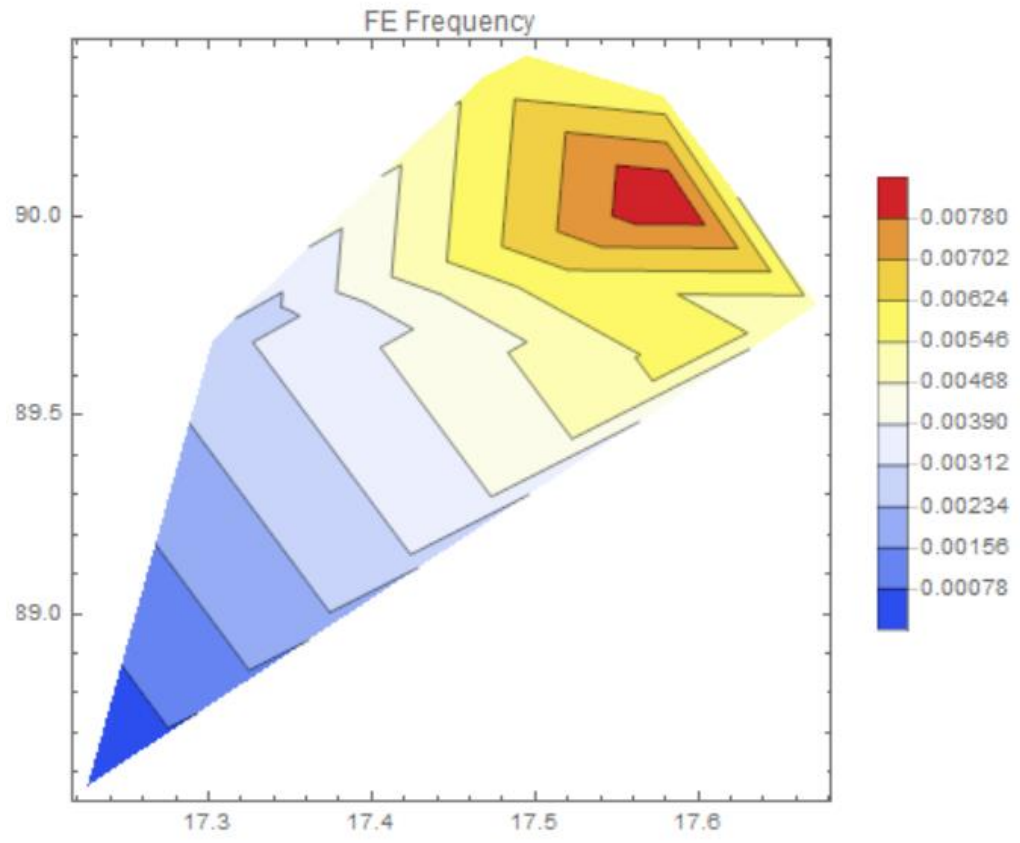


**Very much work in progress**

# Extra Slide: Antoine Equation for Vapor Pressure

- **Antoine equation with 3 parameters**

$$Log_{10}P_V = A - \frac{B}{C + T}$$

- **With $P_V$ in bar and $T$ in kelvin**
- **Three parameters A, B, and C are measured experimentally**
- **From NIST data for C3F8 measured over $T \in [193.78\ K, 236.81\ K]$**
  - **A = 4.08856**
  - **B = 842.613**
  - **C=-30.023**
- **Equation is only valid over certain temperature ranges**

# Extra Slide: Log

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **109** | COSMICS | | | 17.5 | 85 | 12458 | 124 | Changing Beam to T=5.15 MeV @ 0.1 uA |
| **110** | COSMICS | | | 17.5 | 85 | 6868 | 59 | |
| **111** | COSMICS | | | 17.5 | 85 | 5522 | 56 | |
| **112** | DATA | 5.15 | 0.10 | 17.5 | 85 | 6331 | 90 | T=5.15MeV setup complete. Current disparity between BCM ~60uA but Picoam ~0.1uA <-trusted |
| **113** | DATA | 5.15 | 0.10 | 17.5 | 85 | 7212 | 90 | |
| **114** | DATA | 5.15 | 2.00 | 17.5 | 85 | 3264 | 120 | |
| **115** | DATA | 5.15 | 2.00 | 17.5 | 85 | 3673 | 137 | |
| **116** | DATA | 5.15 | 2.00 | 17.5 | 85 | 3456 | 128 | |
| **117** | DATA | 5.15 | 3.00 | 17.5 | 85 | 2374 | 112 | Current raised to 3uA to study rate dependance |
| **118** | DATA | 5.15 | 2.00 | 17.5 | 85 | ~3070 | 114 | with altered beam orbit in progress at 2 uA to study rate dependence at the end of shift |
| **119** | TEST BEAM | 5.15 | 2.00 | | | ~3690 | 241 | Put in the xray viewer and worked with Mike and Joe to get steered onto center. Looked like it was beam right 3-4mm and the vertical size was 1.4mm. Centered visually and rounded out beam. |
| **120** | TEST BEAM | 5.25 | 1.00 | 17.3 | 88 | 1768 | 158 | xray viewer in |
| **121** | TEST BEAM | 5.05 | 1.00 | 17 | 85 | 293 | 121 | TEST RUN TO CHECK RATES, xray viewer in |
| **122** | DATA | 5.15 | 2.00 | 17 | 85 | 7202 | 317 | xray viewer removed and collimator put back in. |
| **123** | DATA | 5.15 | 2.00 | 17 | 85 | 7218 | 332 | |