# WeeklyMT:2025.04.16

- Gas study short summary and schedule
- E80-CDC status

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# Gas study short summary

- what I did and what I know

Ar-CO2(90:10) and Ar-C2H6(50:50)
→ Ar-CO2 and Ar-C2H6, omitted gas ratio

| **Ar-C2H6** | **55Fe** | **90Sr** | **Cosmic** |
|---|---|---|---|
| **test chamber** | Gas Gain(Our standard) | ToT, Efficiency | Not yet |
| **E15-CDC** | None | None | ToT, Efficiency |

- **In Ar-CO2 case, ToT of 90Sr is relatively smaller** than that of the Ar-C2H6 case, when comparing the same gas gain point.
- Checking **Cosmic-ray data, the difference becomes even more serious**.

| **Ar-CO2** | **55Fe** | **90Sr** | **Cosmic** |
|---|---|---|---|
| **test chamber** | Gas Gain(Our standard) | ToT , Efficiency (small..) | Not yet |
| **E15-CDC** | None | None | ToT, Efficiency (very small..) |

# Gas study short summary

- what I did and what I know

| Ar-C2H6 | 55Fe | 90Sr | Cosmic |
|---|---|---|---|
| **test chamber** | Gas Gain(Our standard) | ToT, Efficiency | Not yet |
| **E15-CDC** | None | None | ToT, Efficiency |

- **The Ar–$CO_2$ gas mixture shows broader QDC and ToT spectra**,
  and exhibits **more noise than Ar–$C_2H_6$**,
  resulting in lower detection efficiency, **even under sufficiently high voltage**.

| Ar-CO2 | 55Fe | 90Sr | Cosmic |
|---|---|---|---|
| **test chamber** | Gas Gain(Our standard) | ToT , Efficiency (small..) | Not yet |
| **E15-CDC** | None | None | ToT, Efficiency (very small...) |

# Gas study short summary

- what I should
  - **I want to complete the experiment only in the test chamber.**
  - **もしE15-CDC-Cosmicと同じような結果なら「そーゆーもんか」と理解する。**
    **違う結果であれば、、、うーん**

| **Ar-C2H6** | **55Fe** | **90Sr** | **Cosmic** |
|---|---|---|---|
| **test chamber** | Gas Gain(Our standard) | ToT, Efficiency | Not yet |
| **E15-CDC** | None | None | ToT, Efficiency |

| **Ar-CO2** | **55Fe** | **90Sr** | **Cosmic** |
|---|---|---|---|
| **test chamber** | Gas Gain(Our standard) | ToT , Efficiency (small..) | Not yet |
| **E15-CDC** | None | None | ToT, Efficiency (very small...) |

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# Gas studyの辞書的なものの写し; 概要

| Overview | 内容1 | 内容2 | Ar-CO2 | Ar-C2H6 | コメント1 | コメント2 | コメント3 |
|---|---|---|---|---|---|---|---|
| Garfield | Electric Field | | ☑ | ☑ | | | |
| | Drift Velocity | | ☑ | ☑ | sauli等に載っている過去データと形(Velocity vs 電場)が一致しない。 | | |
| | Diffusion | | ☑ | ☑ | | | |
| | Gain | | ☑ | ☑ | 使う関数によって絶対値が変わるが、相対比はほぼ一定。 | | |
| | Drift Time | | ☑ | ☑ | | | |
| | | | | | | | |
| Test Chamber | 波形 (55Fe) | analog (raw) | ☑ | ☑ | 以下、線源位置はHV側。 | Gainは波形 (55Fe)を積分することによって導出。 | 増幅率が等しいのは2200Vと2700V |
| | | analog (after ASD) | ☑ | ☑ | | | |
| | 波形 (90Sr) | analog (raw) | ☑ | ☑ | 55Feの場合と相対的には、大きな矛盾は無い。 | 宇宙線だと55Feと相対的に大きく異なる結果になるのか？ | |
| | | analog (after ASD) | ☐ | ☑ | | | |
| | QDC (55Fe) | analog (after ASD) | ☑ | ☑ | 55Feの場合と相対的には、大きな矛盾は無い。 | そりゃそう。 | |
| | TDC (90Sr) | TOT | ☑ | ☑ | Analog sig (55Fe)の場合と相対的には、大きな矛盾は無い。 | TOT(Ar-CO2) < TOT(Ar-C2H6) が期待されたが。。。 | 再現性確認のためデータ再取得したい。 |
| | | 検出効率 | ☑ | ☑ | | | |
| | TDC (宇宙線) | TOT | ☐ | ☐ | データはあるが統計少ない。 | | 再測定の必要あり。 |
| | | 検出効率 | ☐ | ☐ | | | |
| | | | | | | | |
| E15-CDC | TDC (宇宙線) | TOT | ☑ | ☑ | TOT(Ar-CO2) < TOT(Ar-C2H6)。Ar-CO2で検出効率が低い | 同じ増幅率であるが、TOTにすると明らかにAr-CO2の方が小さい。 | |
| | | 検出効率 | ☑ | ☑ | TOT次第 | | 検出効率が等しいのは2400Vと2800V (TOTとコンシステント) |
| | | トラッキング効率 | ☑ | ☑ | TOT次第 | | |
| | | Residual | ☑ | ☑ | 等しい検出効率 --> 等しいResidual。(ArCO2 2400V == ArC2H6 2800V) | | |
| | | | | | | | |
| E80-CDC | 波形 (90Sr) | analog (raw) | ☑ | ☐ | Test Chamberに比べて波高がとても小さい。（何分の１？） | | |
| | | analog (after ASD) | ☐ | ☐ | | | |
| | TDC (宇宙線) | 部分的ASD | ☑ | ☐ | お試し。ノイズだらけ。TOTのピークはかろうじて見える。 | | |
| | | | | | | | |

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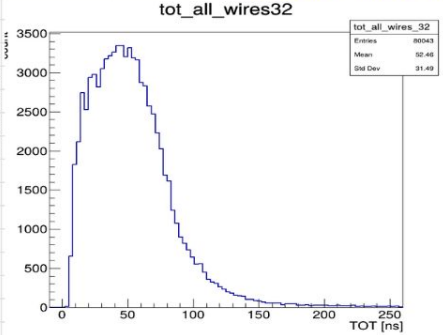
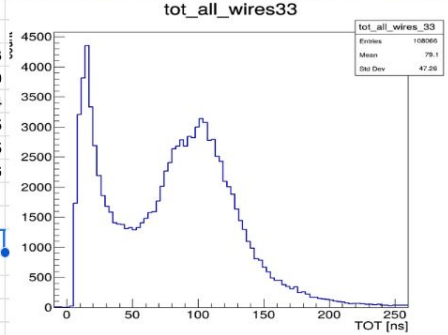
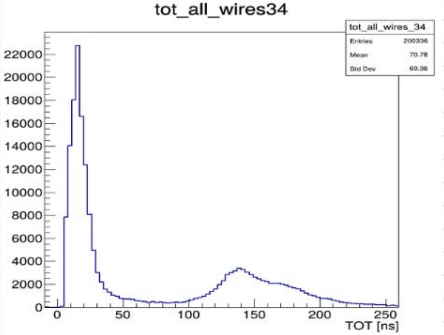
# Gas studyの辞書的なものの写し; TOT, 90Sr, Test chamber

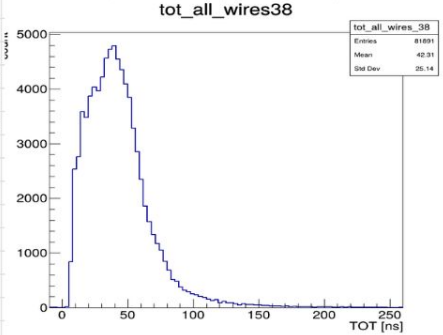
| TOT比較 | ＊増幅率が等しいのは2200Vと2700Vくらい？ TOTピークが等しいのは2350Vと2800V、検出効率が等しいのは2400Vと2800V。 | | |
|---|---|---|---|
| **Test chamber (90Sr)** | | | |
| **ArCO2 (90:10)** | | | |
| **run# (nuc1:~/HUL_MHTDC/data/)** | 32 | 33 | 34 |
| **HV [V]** | 2200 | 2300 | 2400 |
| **Gain** | 1.50E+04 | 3.21E+04 | 6.33E+04 |
| **Field wire current [uA]** | 0.48 | 1.5 | 4.3 |
| **TOT peak [ch]** | 50 | 105 | 135 |
| **Wire Efficiency** | | 0.96 | |

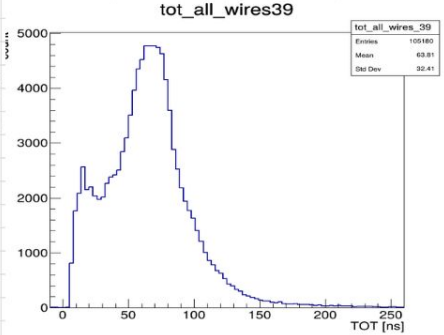


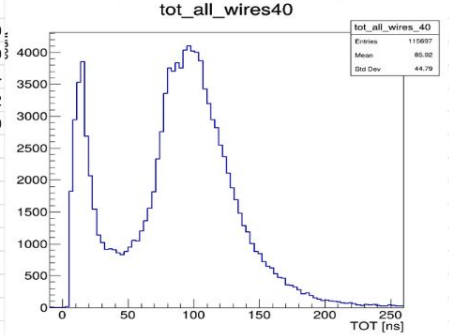



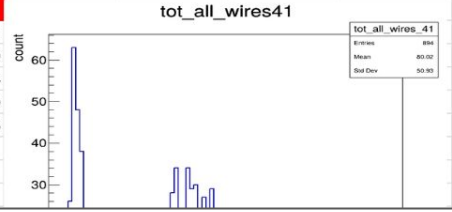

| **ArC2H6 (50:50)** | | | |
|---|---|---|---|
| **run# (nuc1:~/HUL_MHTDC/data/)** | 38 | 39 | 40 |
| **HV [V]** | 2600 | 2700 | 2800 |
| **Gain** | 9.18E+03 | 1.54E+04 | 2.59E+04 |
| **Field wire current [uA]** | 0.34 | 0.66 | 1.22 |
| **TOT peak [ch]** | 45 | 75 | 100 |
| **Wire Efficiency** | | | |




| **宇宙線** | | |
|---|---|---|
| 41 | | |
| 2800 | | |
| 2.59E+04 | | |
| 0 | | |
| 105 | | |



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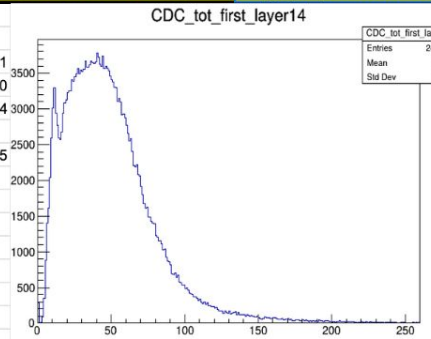
# Gas studyの辞書的なものの写し; TOT, cosmic, E15-CDC

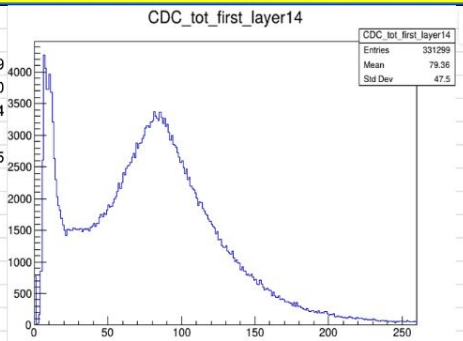
出効率が等しいのは2400Vと2800V。

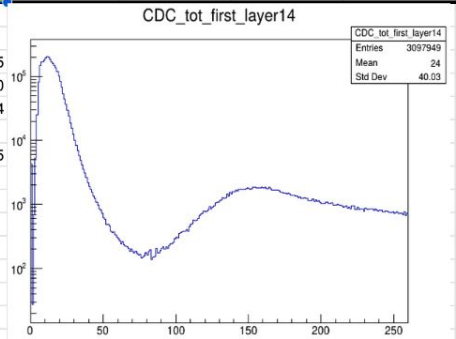
＊増幅率が等しいのは2200Vと2700Vくらい？ TOTピークが等しいのは2350Vと2800V、検出効率が等しいのは2400Vと2800V。

TOT [ns]

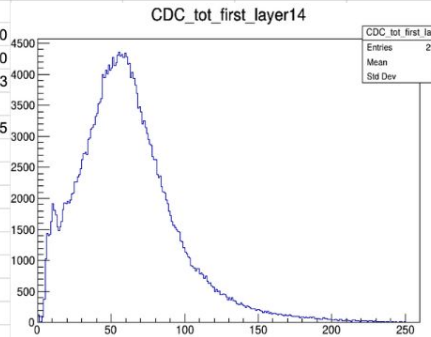
| E15-CDC (宇宙線) | | | |
|---|---|---|---|
| ArCO2 (90:10) | | | |
| run# (kekcc:/group/--) | 51 | 49 | 45 |
| HV [V] | 2200 | 2300 | 2400 |
| Gain | .50E+04 | 3.21E+04 | 6.33E+04 |
| Field wire current [uA] | | | |
| TOT peak [ch] | 45 | 85 | 155 |

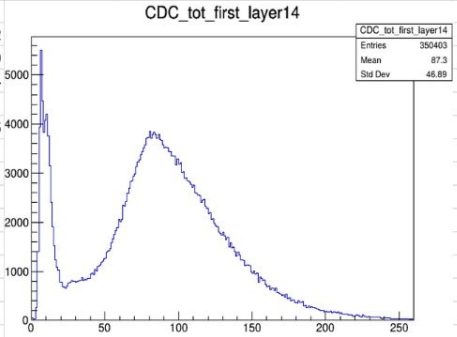


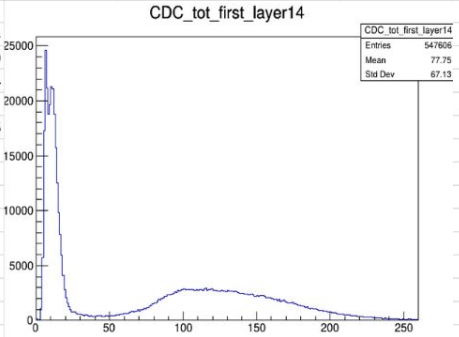




| ArC2H6 (50:50) | | | |
|---|---|---|---|
| run# (nuc1:~/HUL_MHTDC/data/) | 100 | 102 | 104 |
| HV [V] | 2600 | 2700 | 2800 |
| Gain | .18E+03 | 1.54E+04 | 2.59E+04 |
| Field wire current [uA] | | | |
| TOT peak [ch] | 65 | 85 | 105 |



# Test chamber schedule in short term

- 2025.4.16(Wed),(Today), 12:00 :
  - Ar-C2H6 50ml/min to replace 2.5 times
    (~92%, maybe enough because there was no gas change)
- 2025.4.17(Thu), 18:00 :
  - Ar-C2H6 25ml/min
  - data taking of 90Sr, 2600,2700,2800V (~1hour)
  - data taking of cosmic, 2600V (~24hours)
- 2025.4.18(Fri), 18:00 :
  - data taking of cosmic, 2700V (~24hours)
- 2025.4.19(Sat), 18:00 :
  - data taking of cosmic, 2800V (~24hours)
  - Ar-CO2 50ml/min to replace 5 times (~99.3%)
- 2025.4.22(Tue), 18:00 :
  - data taking of cosmic, 2200V (~24hours)
- 2025.4.23(Wed), 18:00 :
  - data taking of cosmic, 2300V (~24hours)
- 2025.4.24(Thu), 18:00 :
  - data taking of cosmic, 2400V (~24hours) **(End)**

残り~82 ml/mins*4days
-> (25 ml/minで)~12 days

Chamber_Gas

ファイル 編集 表示 挿入 表示形式 デ

100% ¥ % .0

fx

| | A | B | C | D |
|---|---|---|---|---|
| | | CDC [SCCM] | | ArC2H6 [MPa] |
| | time | in | out | primary |
| | 2024/05/30 1:03 | 46.18 | 39.71 | 1.1 |
| | 2024/05/30 8:45 | 31.2 | 37.5 | 1 |
| | 2024/05/30 17:05 | 46 | 42 | 1 |
| | 2024/05/31 1:23 | 91.4 | 85.3 | 1 |
| | 2024/05/31 8:48 | 101 | 97.3 | 1 |
| | 2024/05/31 16:36 | 123 | 95.5 | 0.7 |
| | 2024/06/01 1:02 | 92 | 90 | 0.5 |
| | 2024/06/01 9:02 | 75.1 | 69.3 | 0.5 |
| | 2024/06/01 16:20 | 85.3 | 67 | 0.4 |
| | 2024/06/02 12:54 | 93.65 | 81.59 | 0.2 |
| | 2024/06/02 9:08 | 36.7 | 79.8 | 0 |
| | 2024/06/02 17:00 | 38 | 32 | 0 |
| | 2024/06/03 1:00 | 95.96 | 84.43 | 0 |
| | 2024/06/03 9:03 | 70.8 | 66.2 | 0 |
| | 2024/06/03 16:55 | 87.2 | 75.5 | 0 |
| | 2024/06/04 2:18 | 94.91 | 83.97 | 0 |
| | 2024/06/04 8:58 | 77.4 | 68.6 | 0 |
| | 2024/06/04 16:54 | 84.5 | 60.4 | 0 |
| | 2024/06/05 9:13 | 84.6 | 80.6 | 3.5 |
| | 2024/06/05 16:30 | 37 | 24 | 3.2 |

Total 82 ml/min * 5days (E73_2024)

# E80-CDC

- HV問題、未解決。
  - エイジング不足と見て、ひたすら2000Vかけていたが果たして効果はあるのか
- リークディテクター待ち（Gas in-outの非保存の確認）
- この後、一度2300Vくらいまであげてみるか？