# Weekly Meeting 241117

Status of the E80-CDC,
the first analysis of the test chamber
and status of my master thesis

Y. Kimura

先週金曜までの状況の大雑把な確認

# ~ Last Week

- E80-CDC
  - Modified the broken wires by Hayashi-Repic (Suzuki-san, Iida-san, Fukutomi-san)
  - Restarted the commissioning

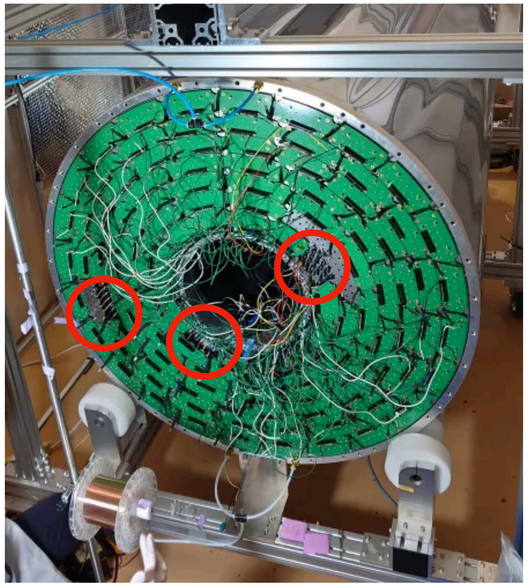
- Test Chamber
  - Built a reliable gas line
  - Checked the analog signal before and after the ASD with $^{55}$Fe
  - Acqired the first QDC data after the ASD with $^{90}$Sr

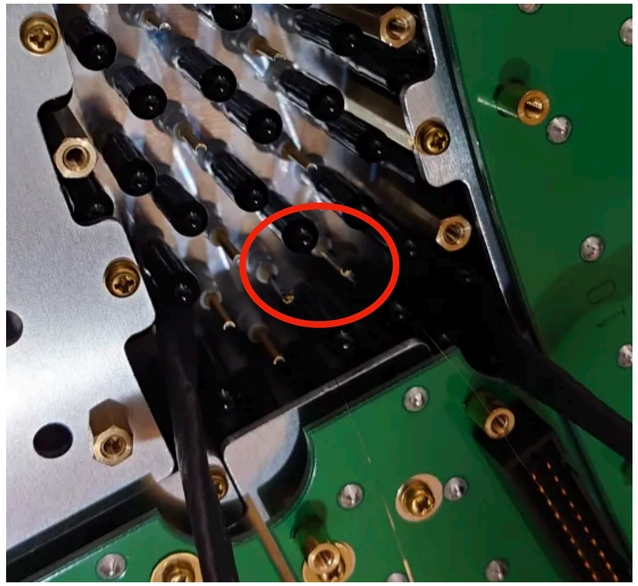
- Master Thesis
  - Hardly written

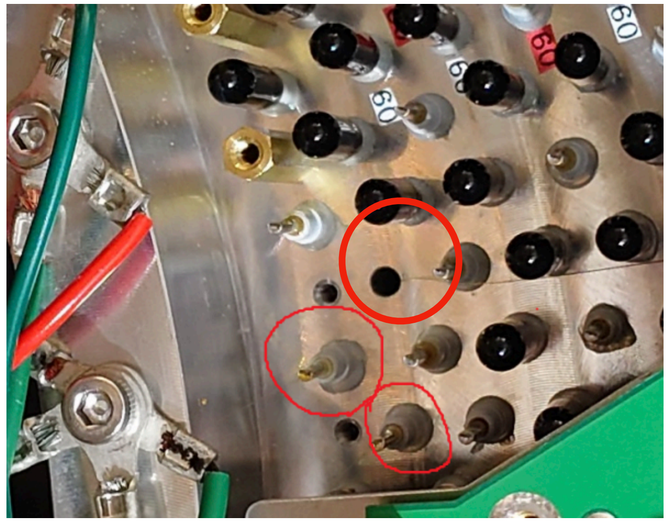
ワイヤー修理の整理

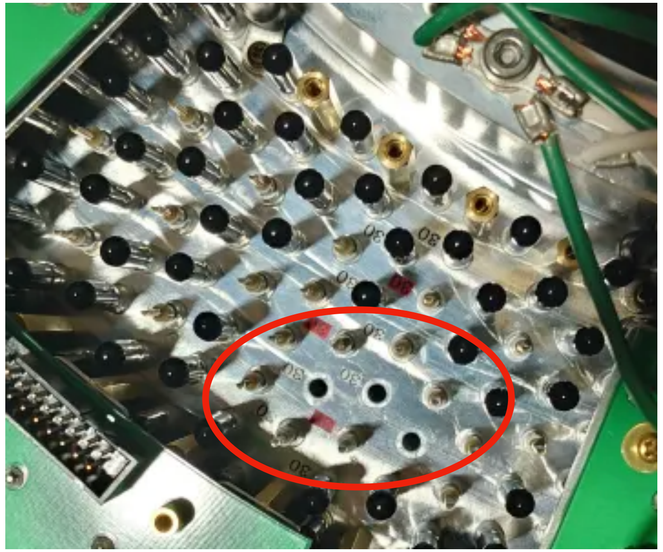
# Re-stringing wires of E80-CDC

- Layer10, No.45(s) (not fully inserted)
  - With SLayer5-2, No.51(f)
- Inner, No.58(g) (broken)
  - With SLayer1-1, No.57(f) and No.55(f)
- SLayer1-3, No.30(f) (broken)
  - With SLayer1-3, No.31(f) and No.32(f)





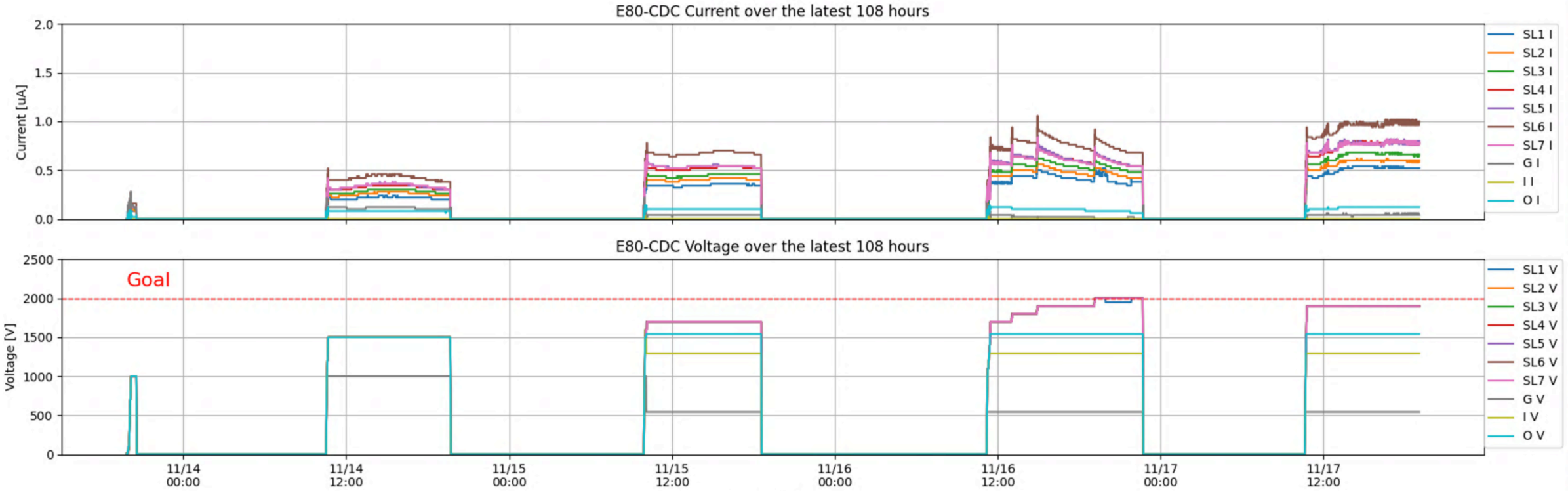




コミッショニング状況の提示

# E80-CDC Commissioning

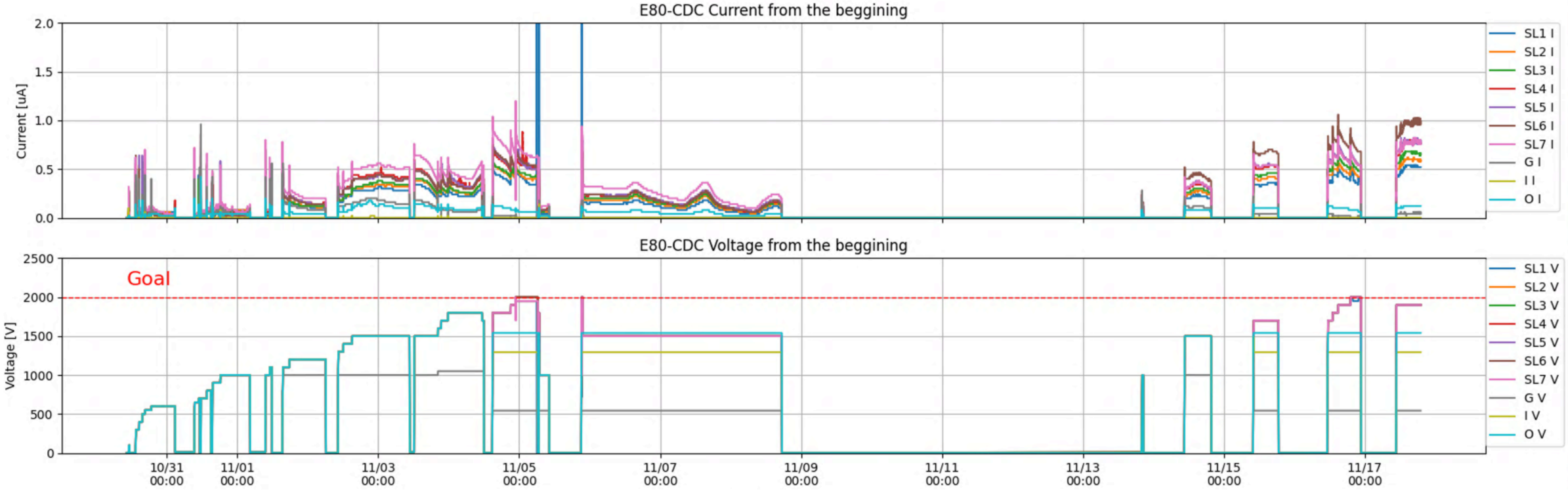
- Goal : 2000V (2400V in the future)
- From wire modification(2024/11/13) to yesterday(2024/11/17)



コミッショニング状況の提示

# E80-CDC Commissioning

- Goal : 2000V (2400V in the future)
- From the begging(2024/10/30) to yesterday(2024/11/17)
- The current depends on the weather (temp, humid, pressure…)



ガスの状況の説明をしたい

# Test Chamber : Gases

- Ar and CO2 mixture
- From last Wednsday to last Friday, the ratio was set 87:13 ~ 88:12.

Ar gage 148 ml/min, C2H6 gage 14 ml/min

Way to calc is written in slide of last week

Ar 148 ml/min, CO2 20.3 ml/min

Ar : CO2 = 87.9 : 12.1

| Ar [ml/miin] | C2H6 [ml/min] | | |
|---|---|---|---|
| 148 | 14 | | |
| Ar[ml/min] | CO2 [ml/min] | Ratio of Ar | Ratio of CO2 |
| 148 | 20.31372549 | 87.93103448 | 12.06896552 |

Drive/Knucl/E80/CDC-Master/GasConversion

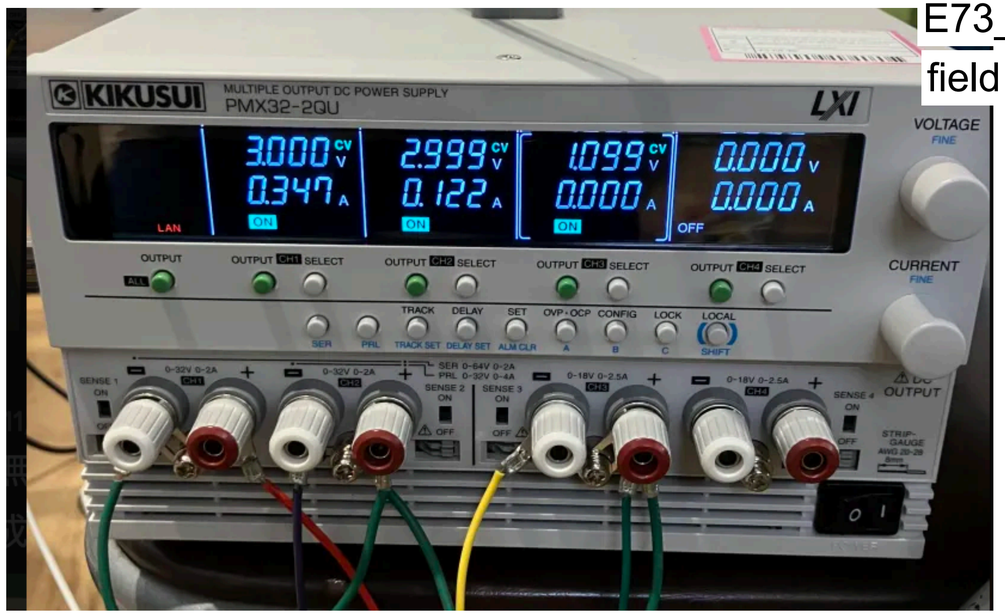
アナログ信号調査のセットアップを説明したい

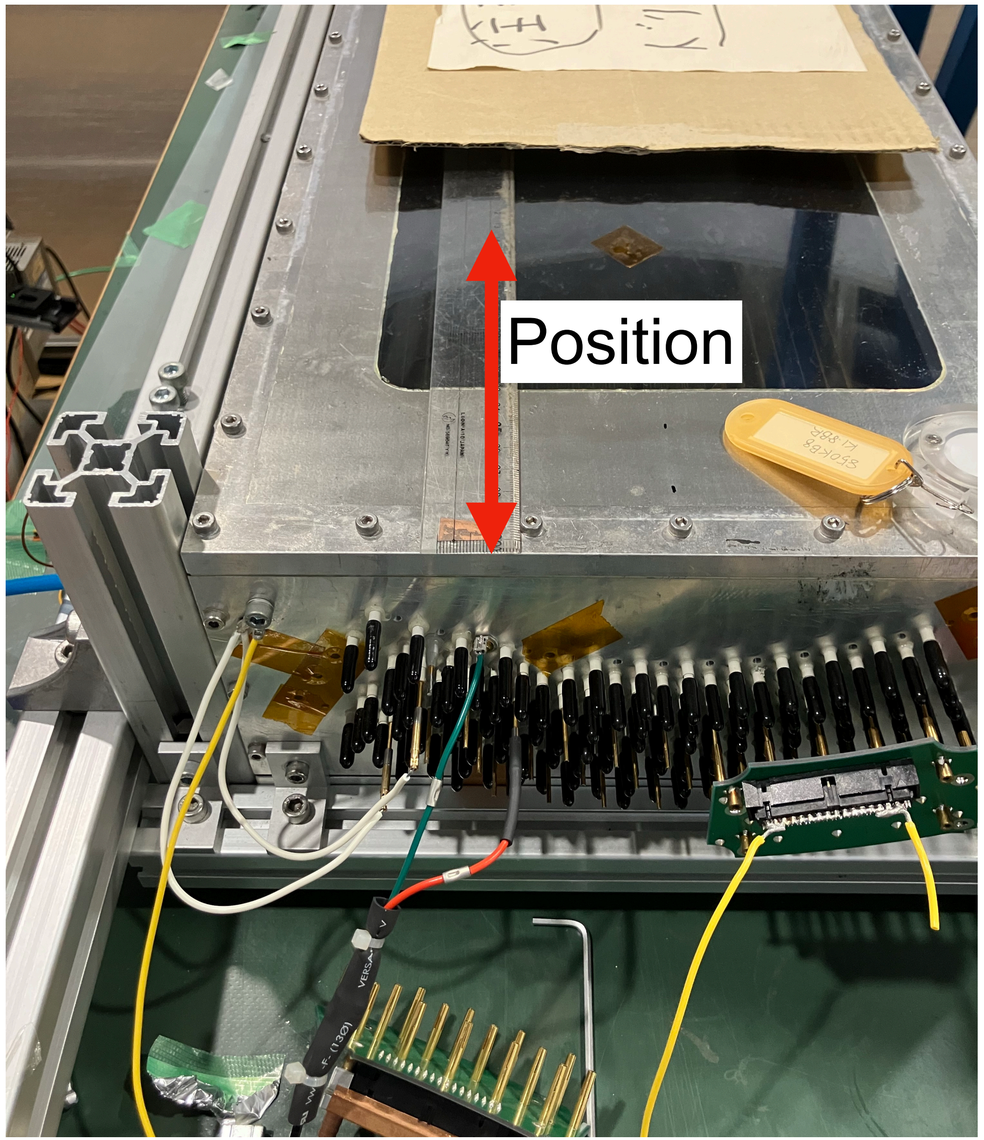
# Test Chamber : Analog Signal

- Ar-CO2 (87:13)
- Using $^{55}$Fe with a collimator (JP 5-yen coin *7)

- Position : 10 cm (From end to end : 89 cm)
- HV of potential wire : 1900~2400 V
- HV of guard wire : 1023~1292 V

E73_2nd set point of field and Inner of Dora-CDC



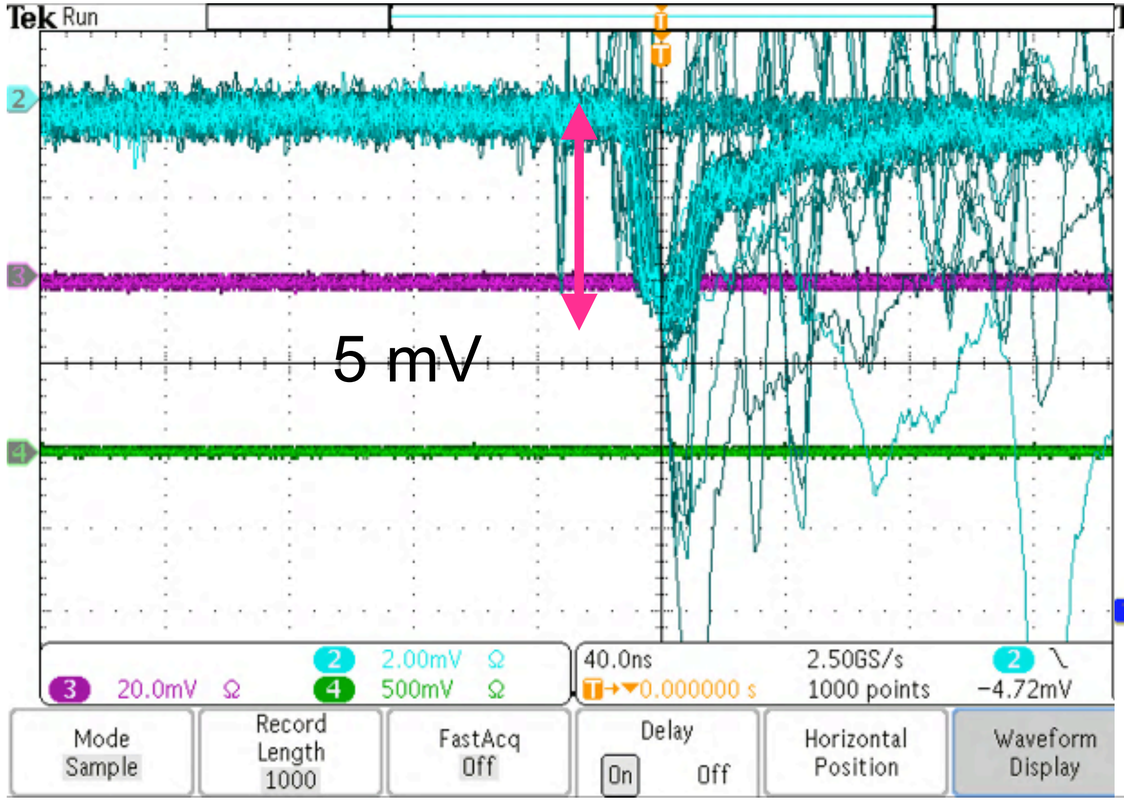



典型的なシグナルを見せたいだけ

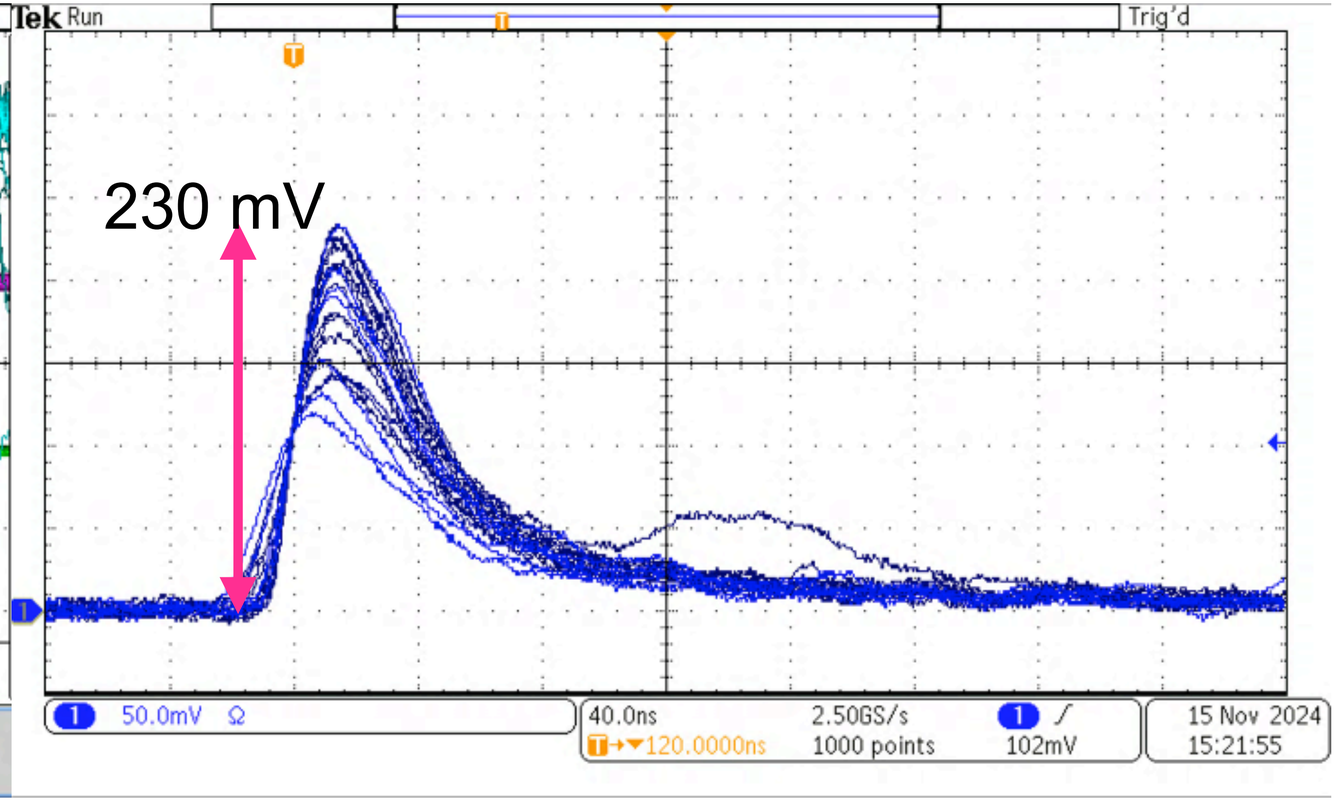
# Test Chamber : Analog Signal

- Typical signal 5 mV —> 230 mV (about 46 times by the amplifer)

**$^{55}$Fe, 10 cm, 2200 V, Before ASD**




**After ASD**

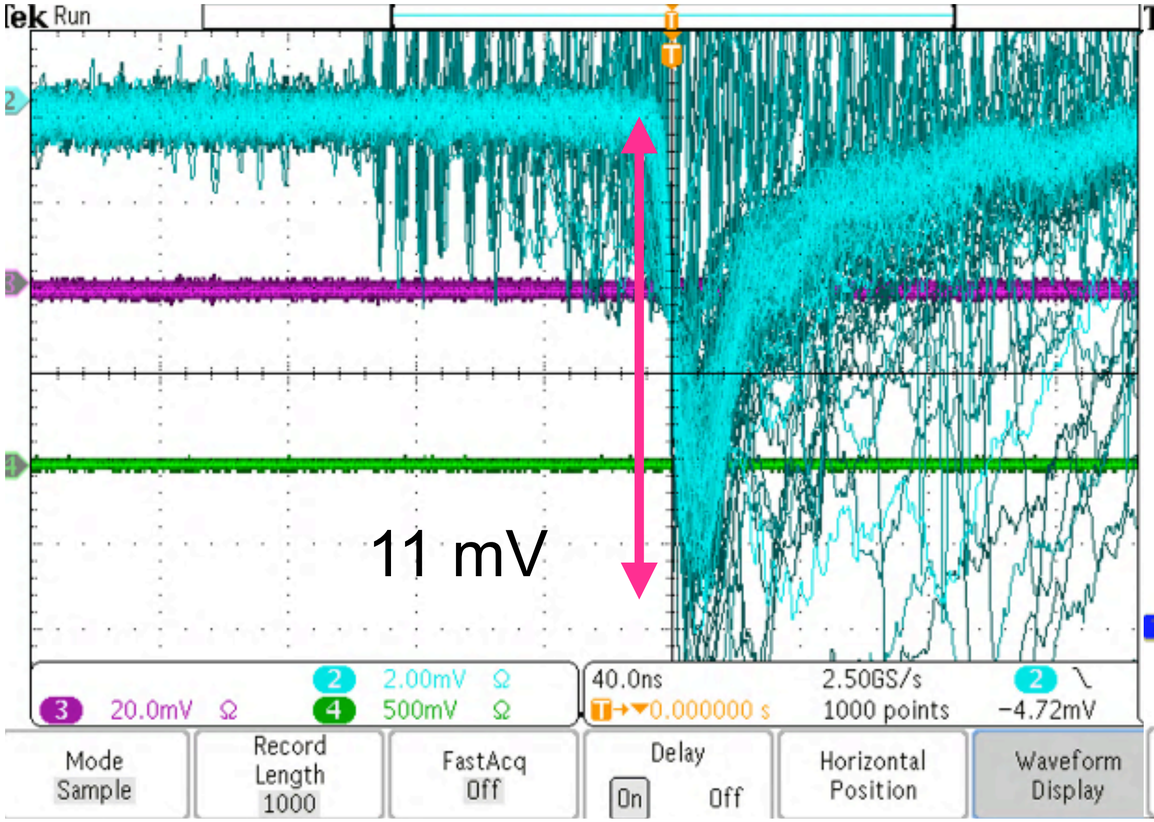


典型的なシグナルを見せたいだけ

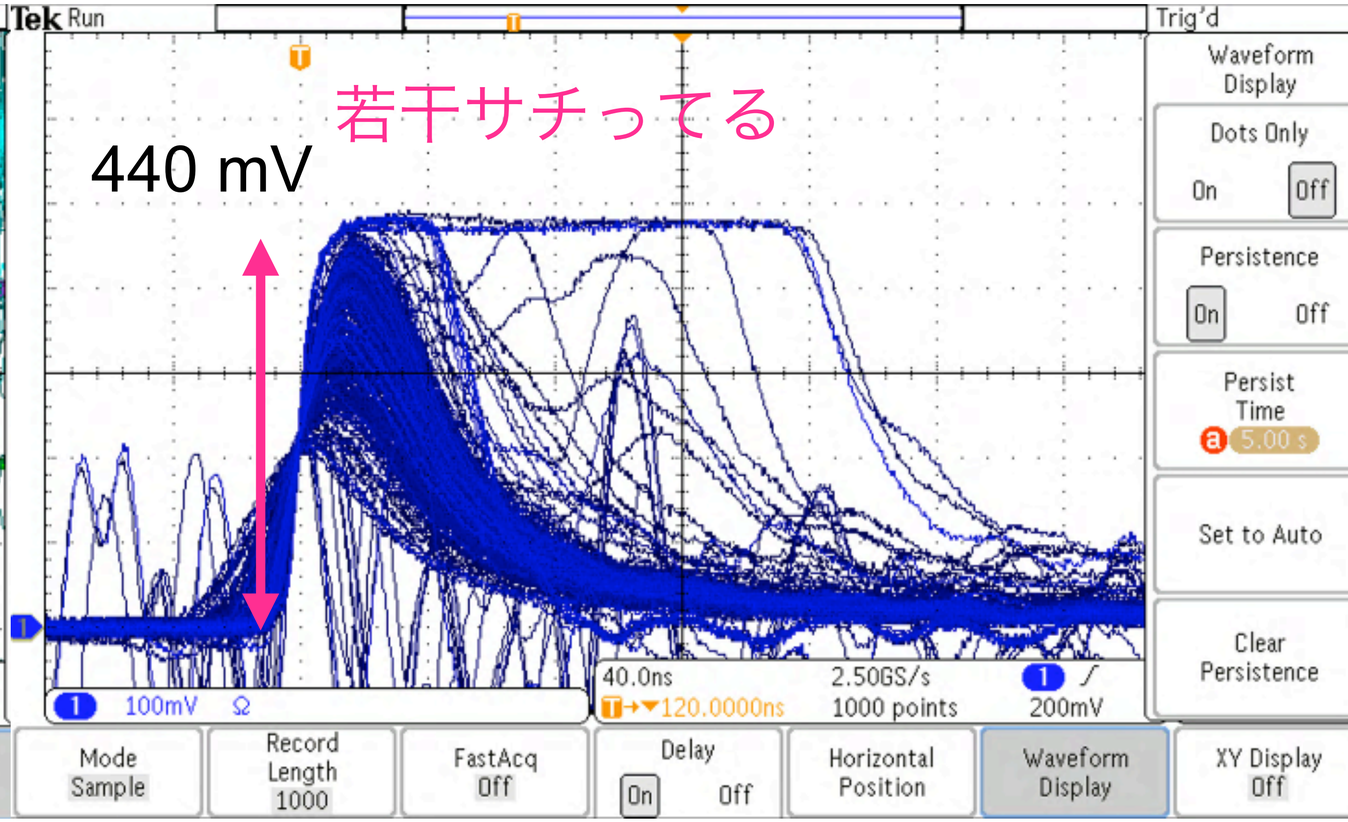
# Test Chamber : Analog Signal

- Typical signal 11 mV —> 550 mV (about 40 times by the amplifer)

**$^{55}$Fe, 10 cm, 2300 V, Before ASD**




**After ASD**

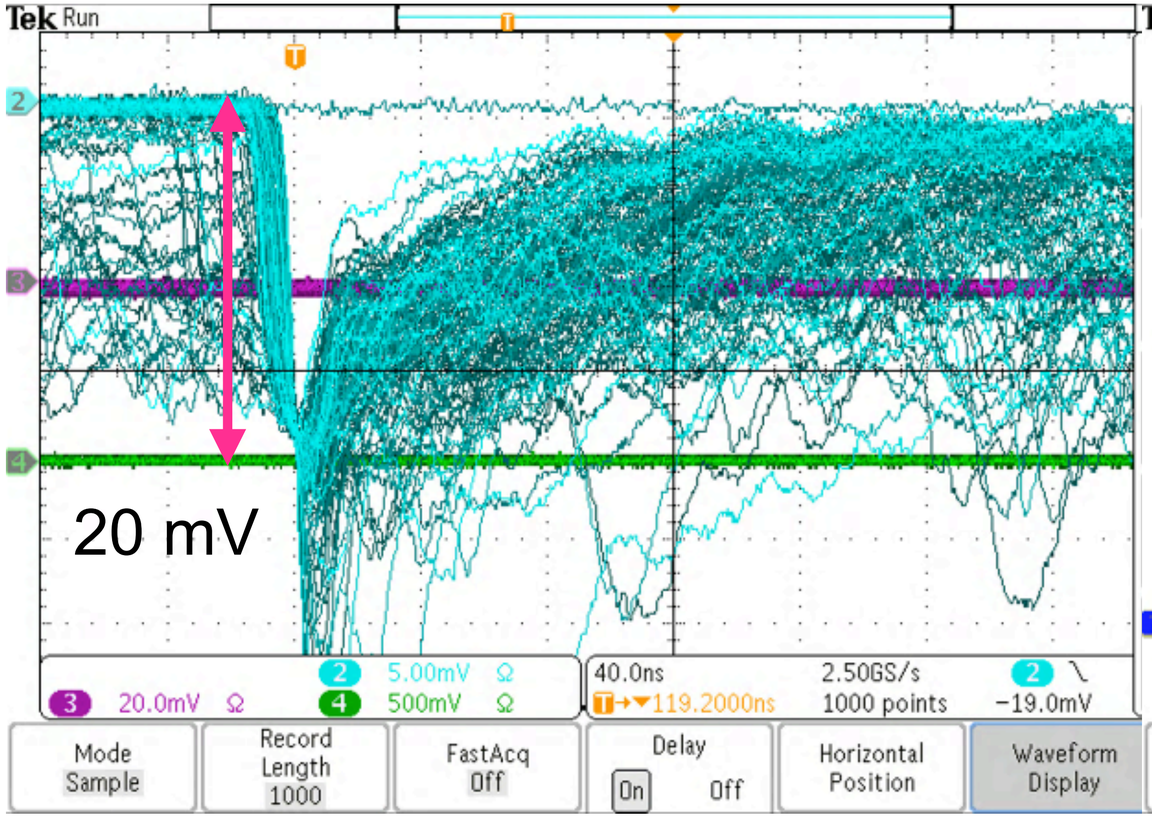


典型的なシグナルを見せたいだけ

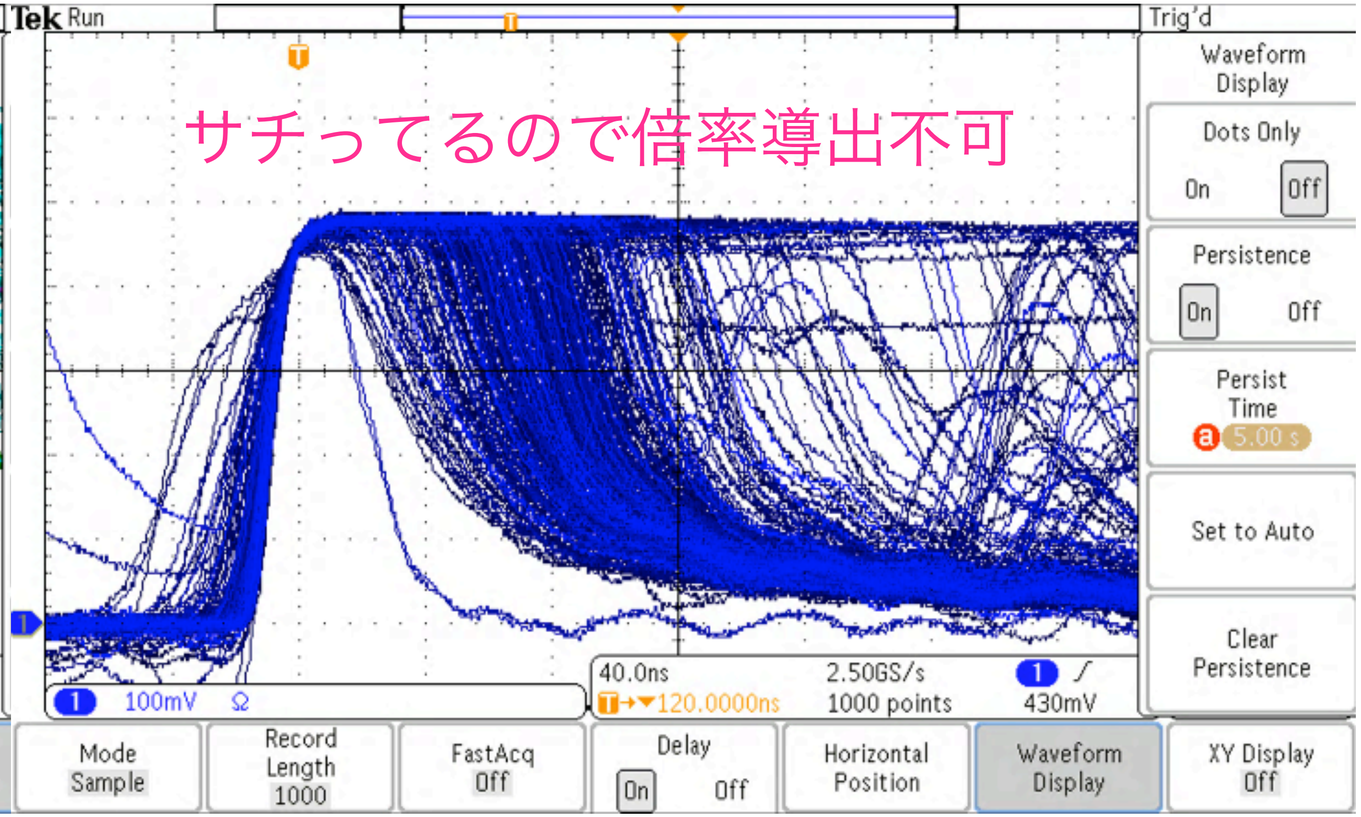
# Test Chamber : Analog Signal

- Typical signal

**$^{55}$Fe, 10 cm, 2400 V, Before ASD**



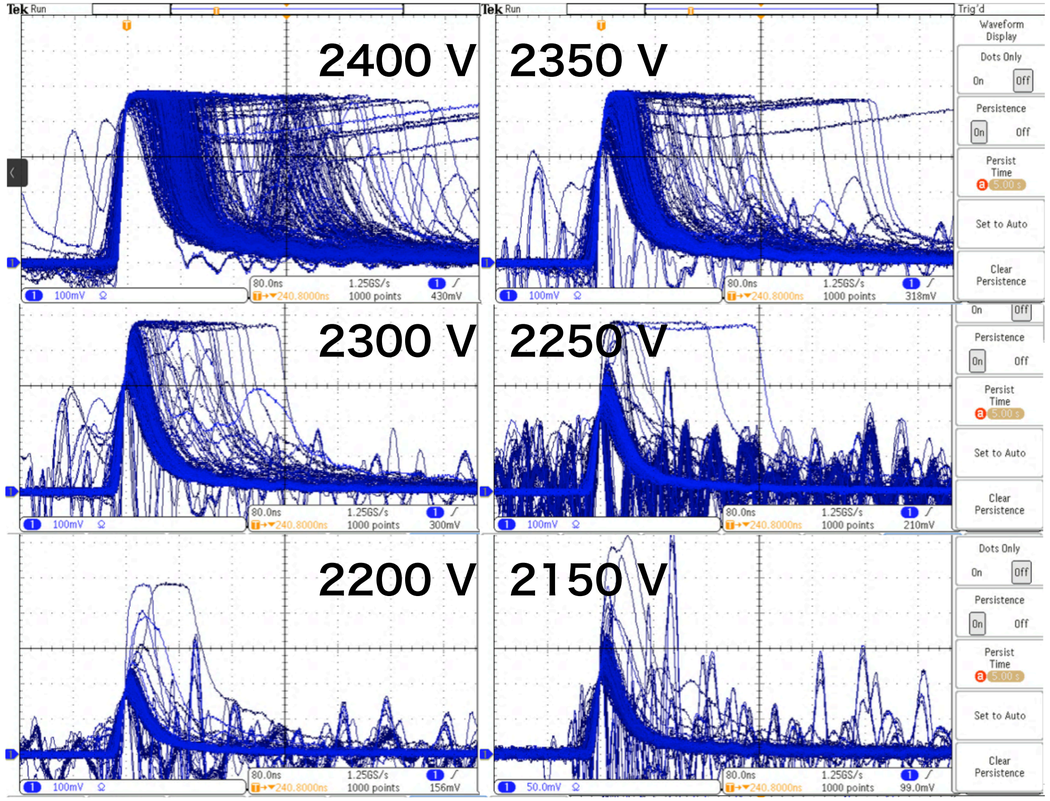

**After ASD**

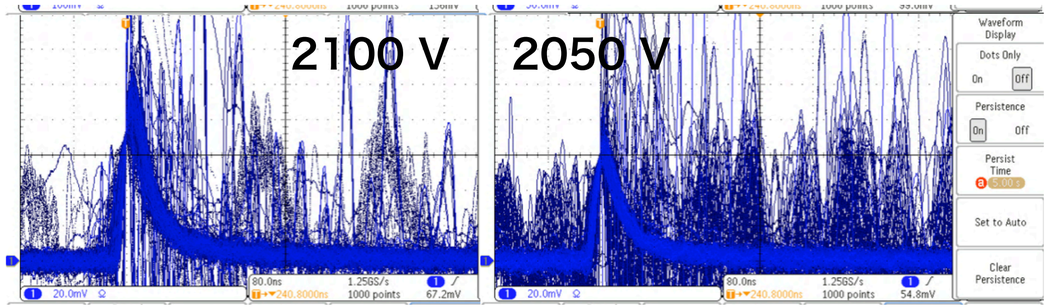


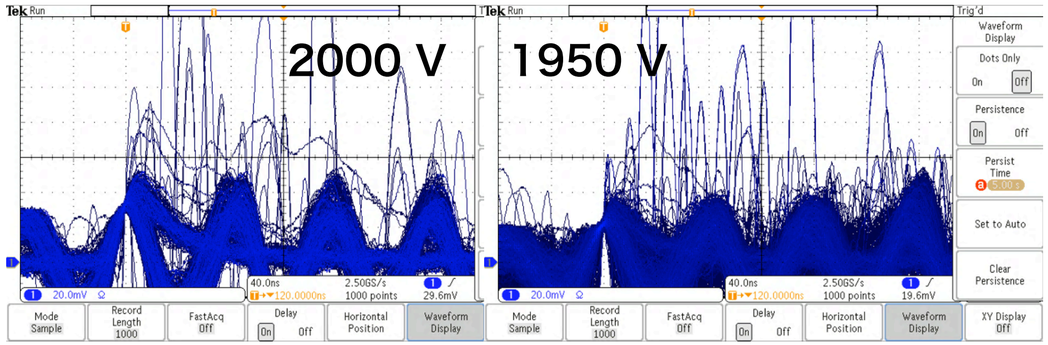
ASD後のアナログについて、もう少し細かい変化を提示。2200Vからさちり始める。2400Vでははっきり第２のシグナルがくる。

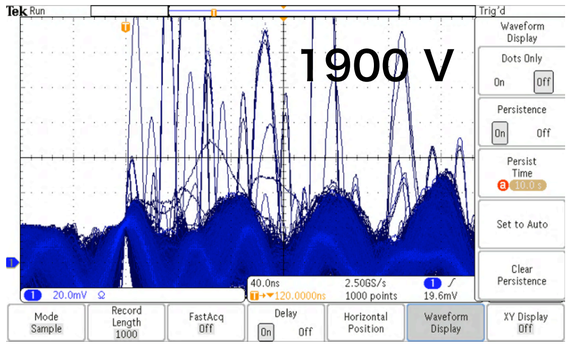
# Test Chamber : Analog Signal

- Analog signal after the ASD
- Checked it in larger time range than previous pages (40 ns —> 80 ns)



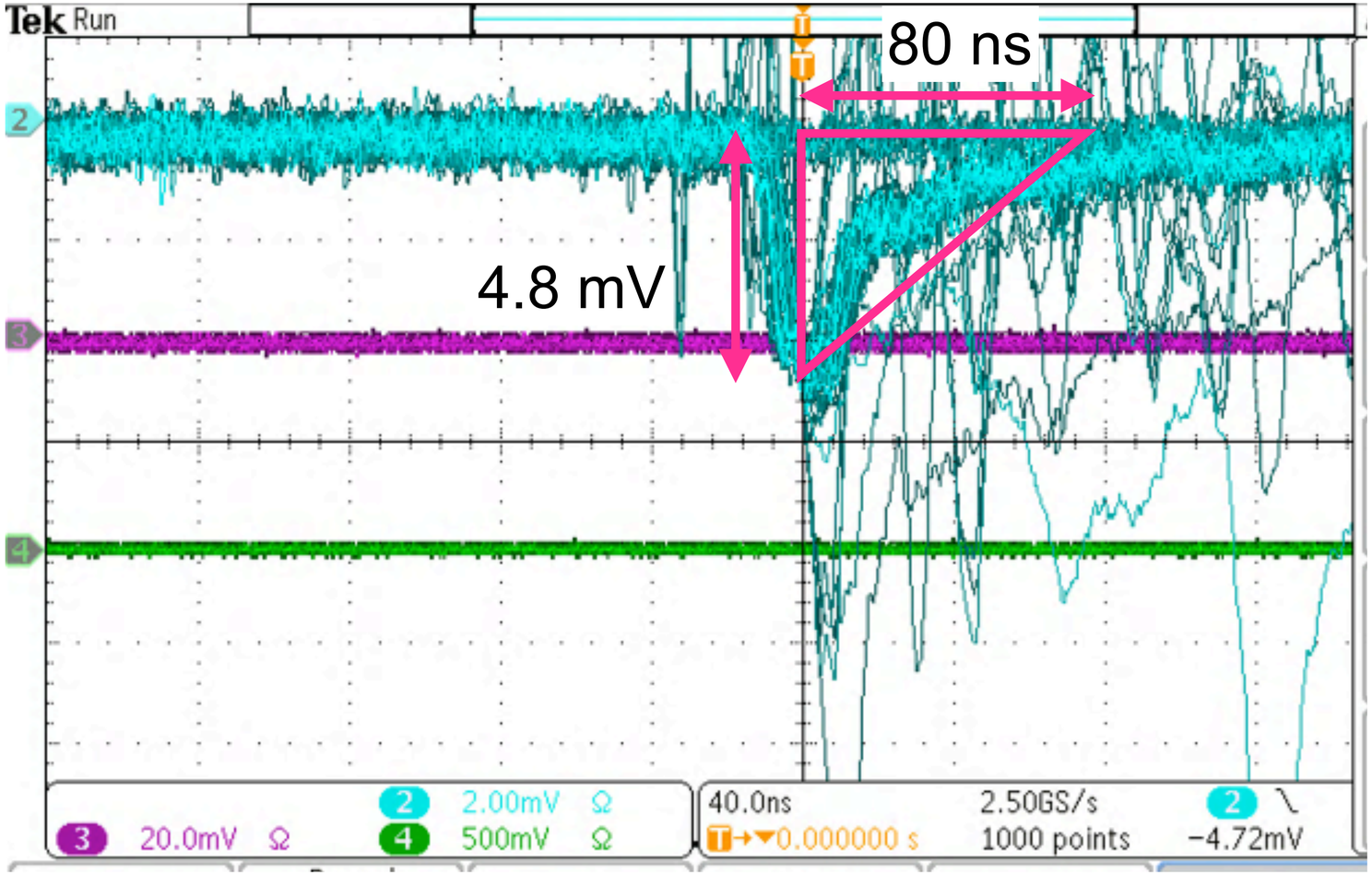



増幅後の大まかな電子数

# Test Chamber : Analog Signal

$^{55}$Fe, 10 cm, 2200 V, Before ASD




Charge = 80 [ns] *4.8 [mV] / 50 [Ohm]
= 7.68 * 10^-12 [C]

Elementary charge = 1.6 * 10^-19 [C]

The number of electrons
= Charge / Elementary charge
= 4.8 * 10^7

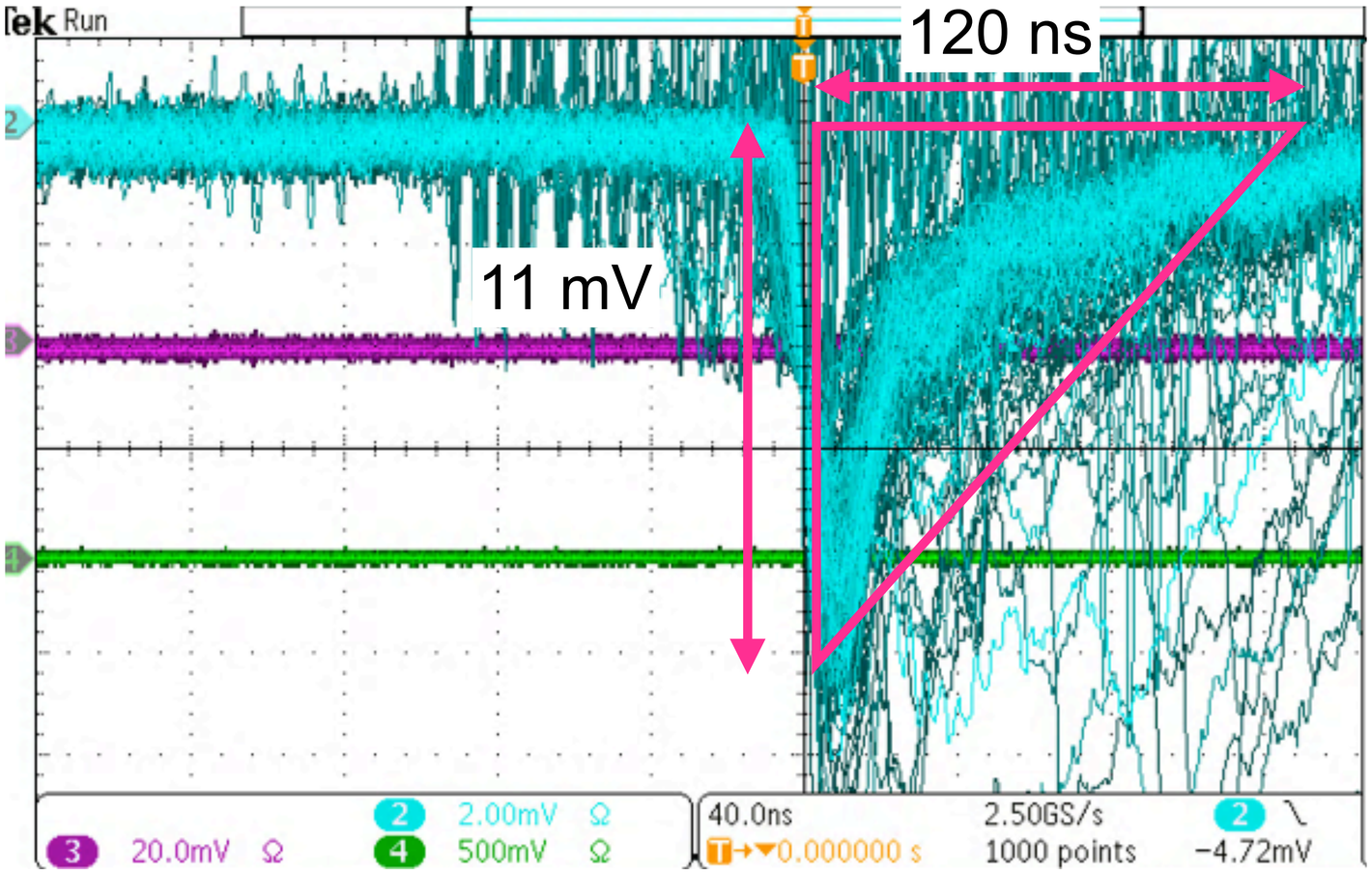
Assume that a X-ray from 55Fe produces 230 primary electrons.

$$G = \frac{4.8 \times 10^7}{230} = 2.1 \times 10^5$$

増幅後の大まかな電子数

# Test Chamber : Analog Signal

**$^{55}$Fe, 10 cm, 2300 V, Before ASD**




Charge = 120 [ns] *11 [mV] / 50 [Ohm]
= 26.4 * 10^-12 [C]

Elementary charge = 1.6 * 10^-19 [C]

The number of electrons
= Charge / Elementary charge
= 1.7 * 10^8

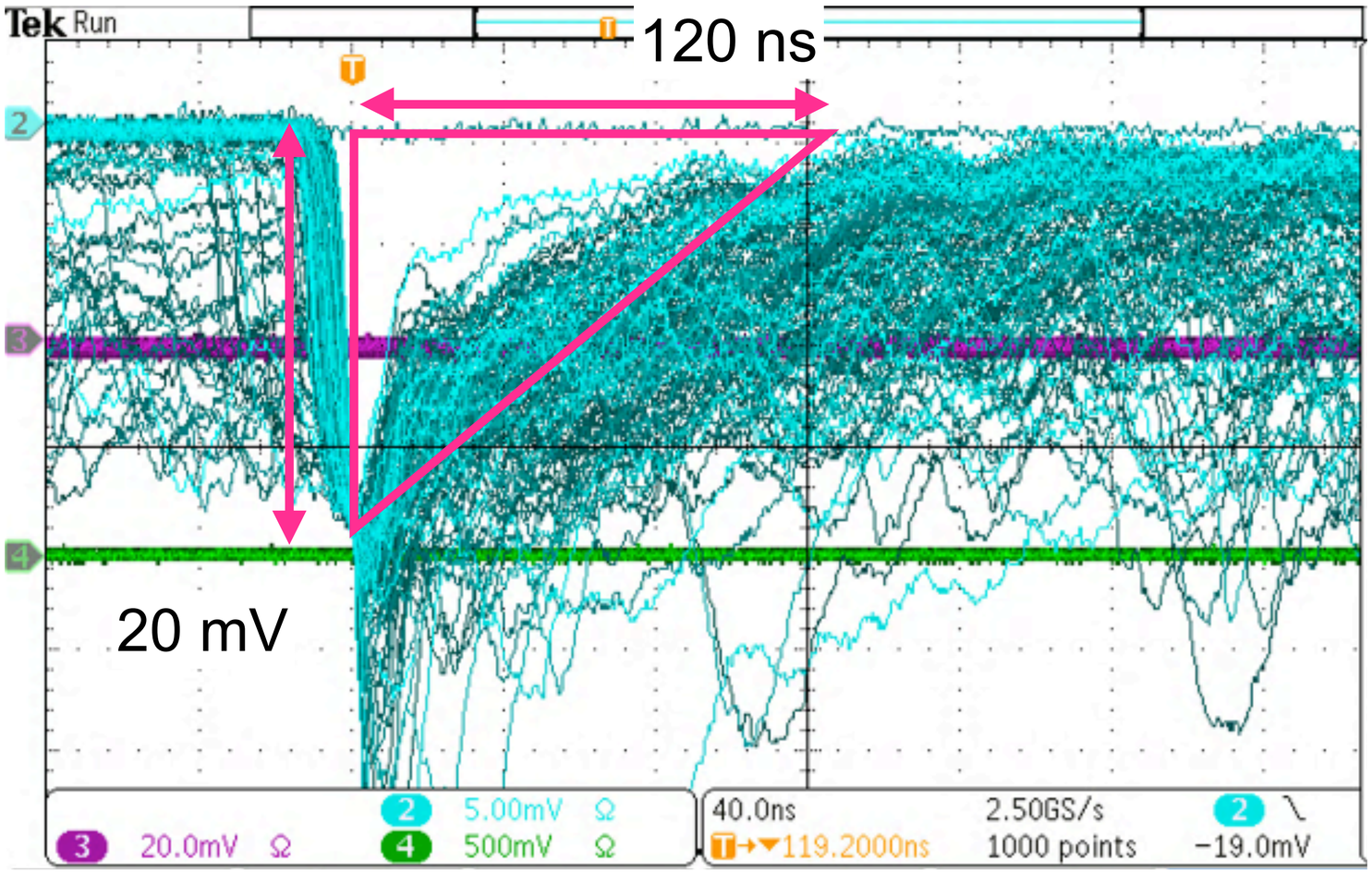
Assume that a X-ray from 55Fe produces 230 primary electrons.

$$G = \frac{1.7 \times 10^8}{230} = 7.4 \times 10^5$$

増幅後の大まかな電子数

# Test Chamber : Analog Signal

**$^{55}$Fe, 10 cm, 2400 V, Before ASD**




Charge = 120 [ns] *20 [mV] / 50 [Ohm]
= 48 * 10^-12 [C]

Elementary charge = 1.6 * 10^-19 [C]

The number of electrons
= Charge / Elementary charge
= 3.0 * 10^8

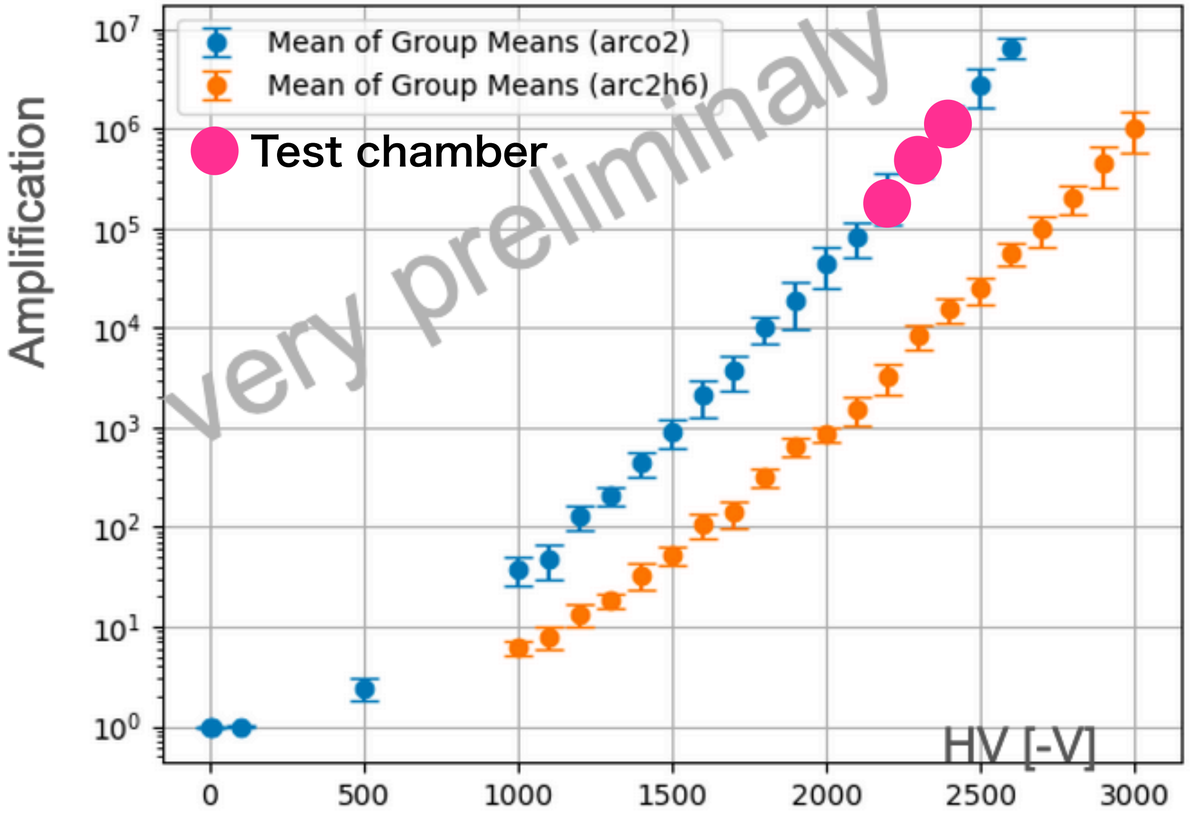
Assume that a X-ray from 55Fe produces 230 primary electrons.

$$G = \frac{3.0 \times 10^8}{230} = 1.3 \times 10^6$$

# Test Chamber : Analog Signal

- ### sim Ar-CO2 (90:10)
- Test Chamber Ar-CO2 (87:13)

シミュレーションと同じような値になる。
実際は3角形も大きく見積もってるし、
シミュレーション90-10ということを考えると、シミュレーションと測定結果がかなりの精度で一致してるっぽい。

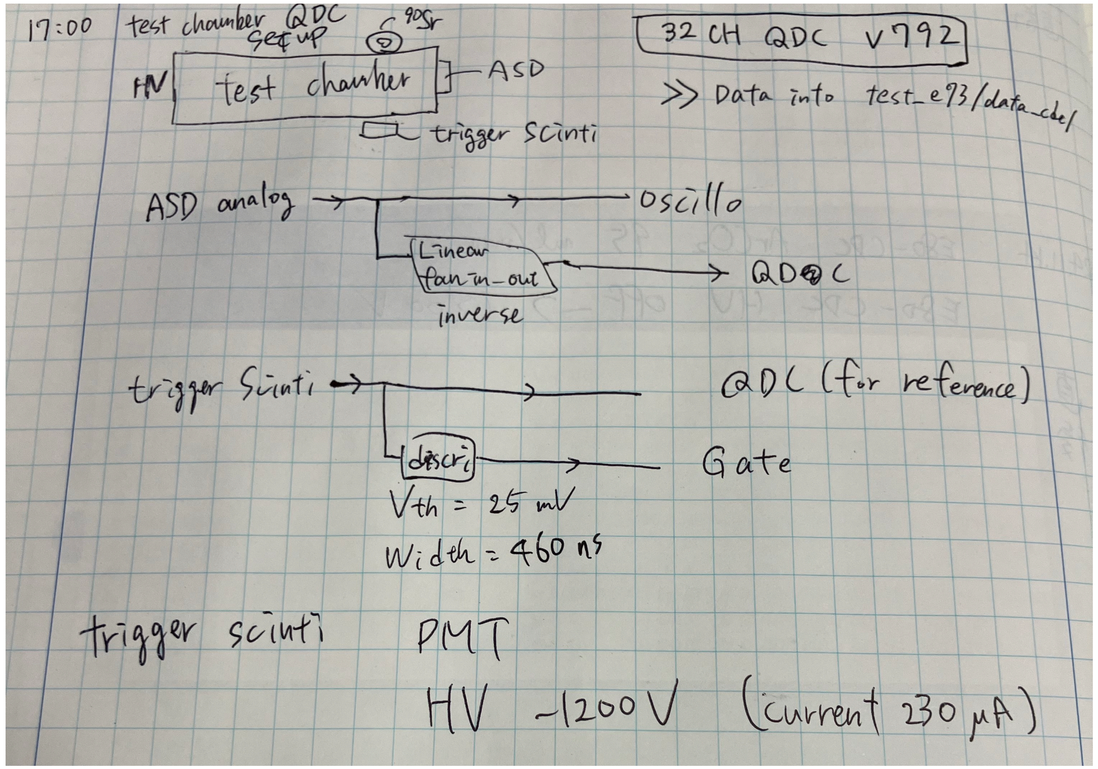


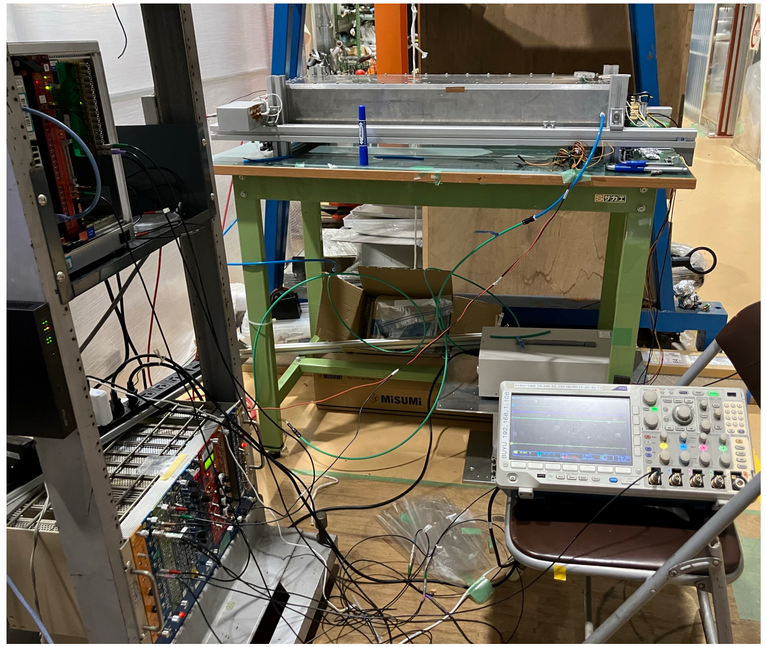

➡ しっかり波形を記録して、その積分をできるようにする。
シミュレーションの最終版とその絵を作る。

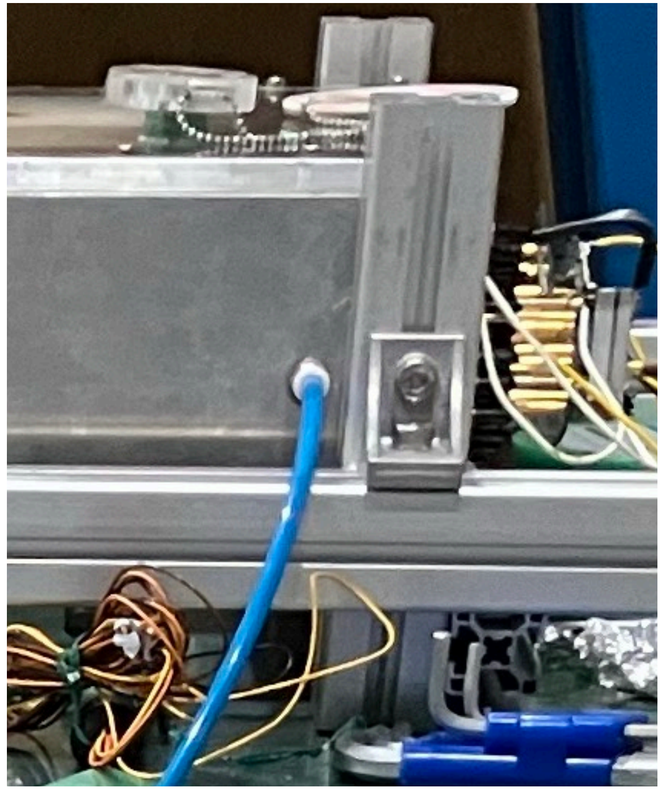
QDC set upの説明

# Test Chamber : QDC data taking

- Run012 ~ Run022 : 1900 V ~ 2400 V
- $^{90}$Sr, Ar-CO2 (87:13), position 10 cm, 4 minutes



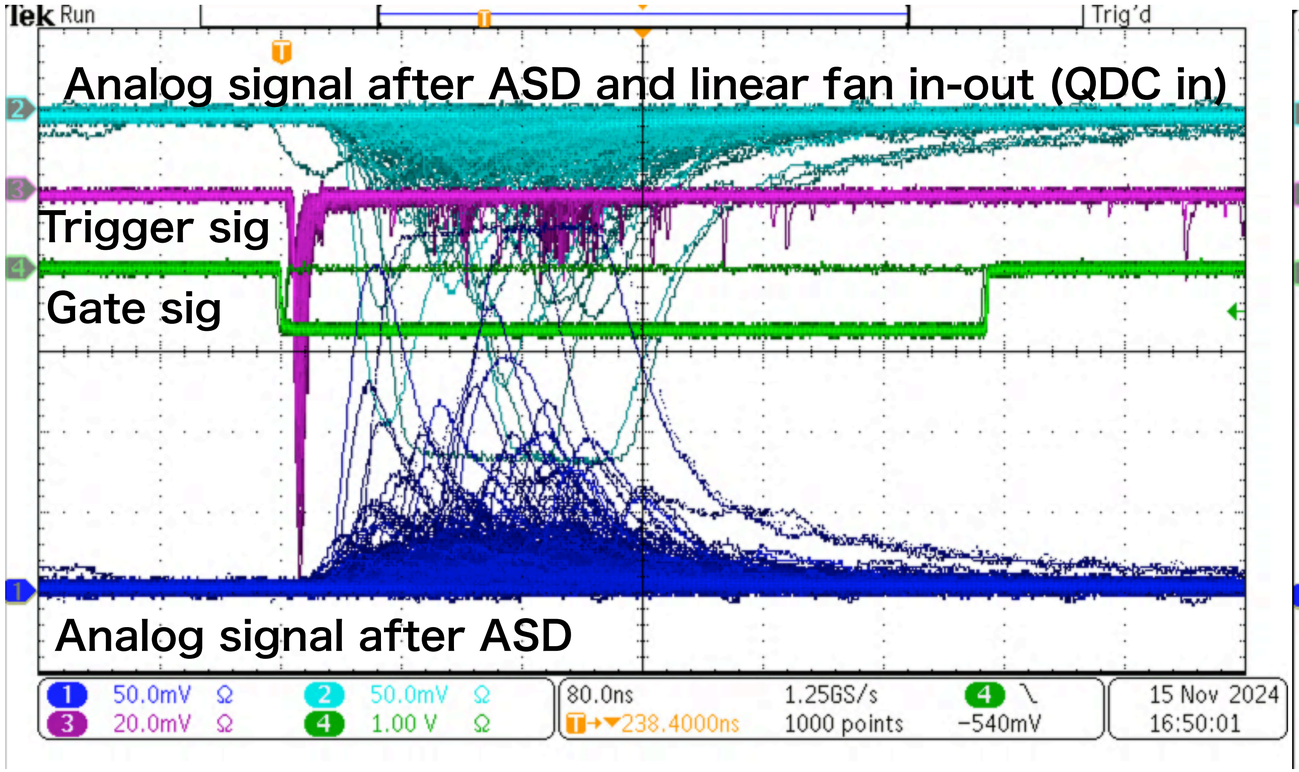





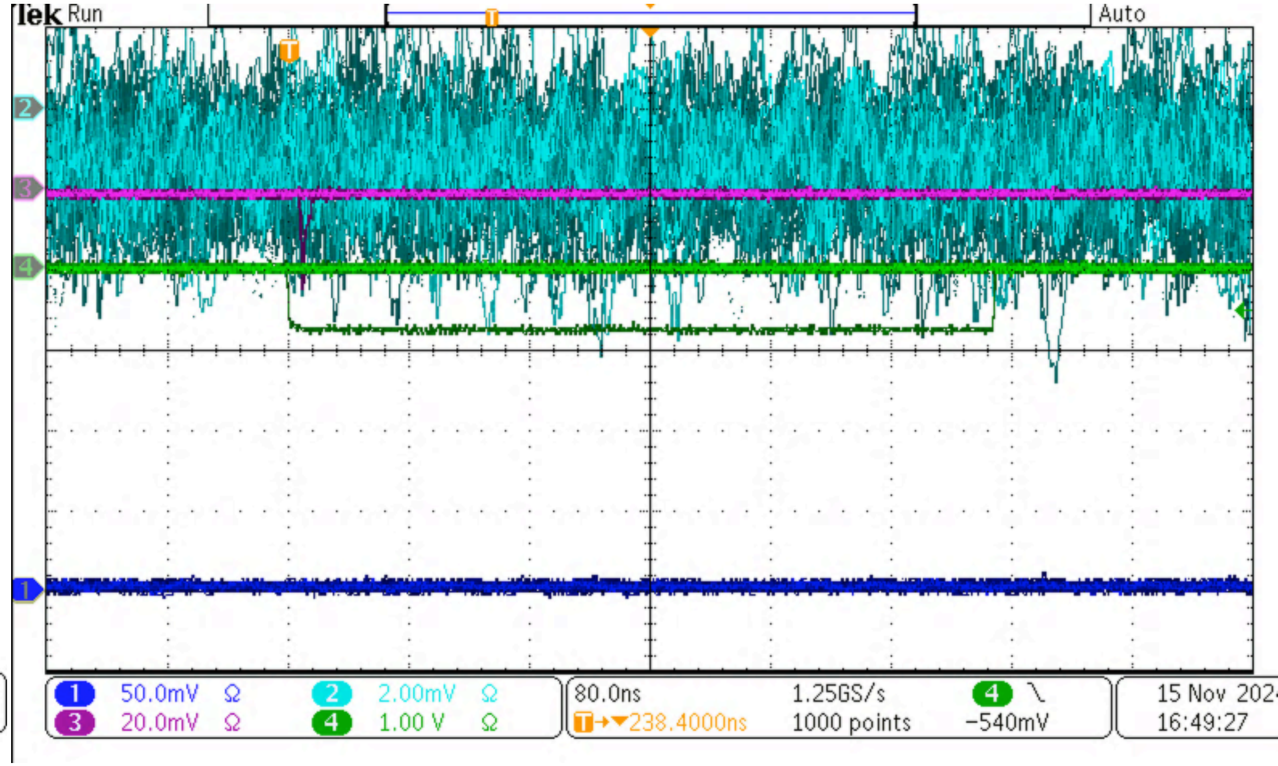
QDC set upの説明

# Test Chamber : QDC data taking

- Run012 ~ Run022 : 1900 V ~ 2400 V
- $^{90}$Sr,  Ar-CO2 (87:13),  position 10 cm




Base Line check (negative) —> ok



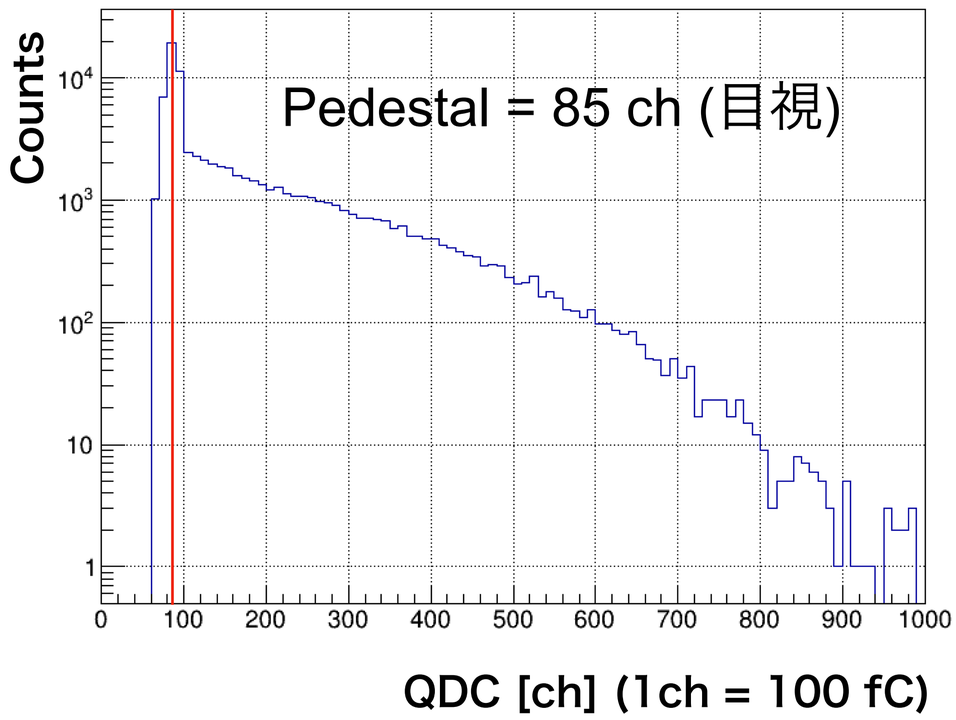
QDCデータの典型例

# Test Chamber : QDC data taking

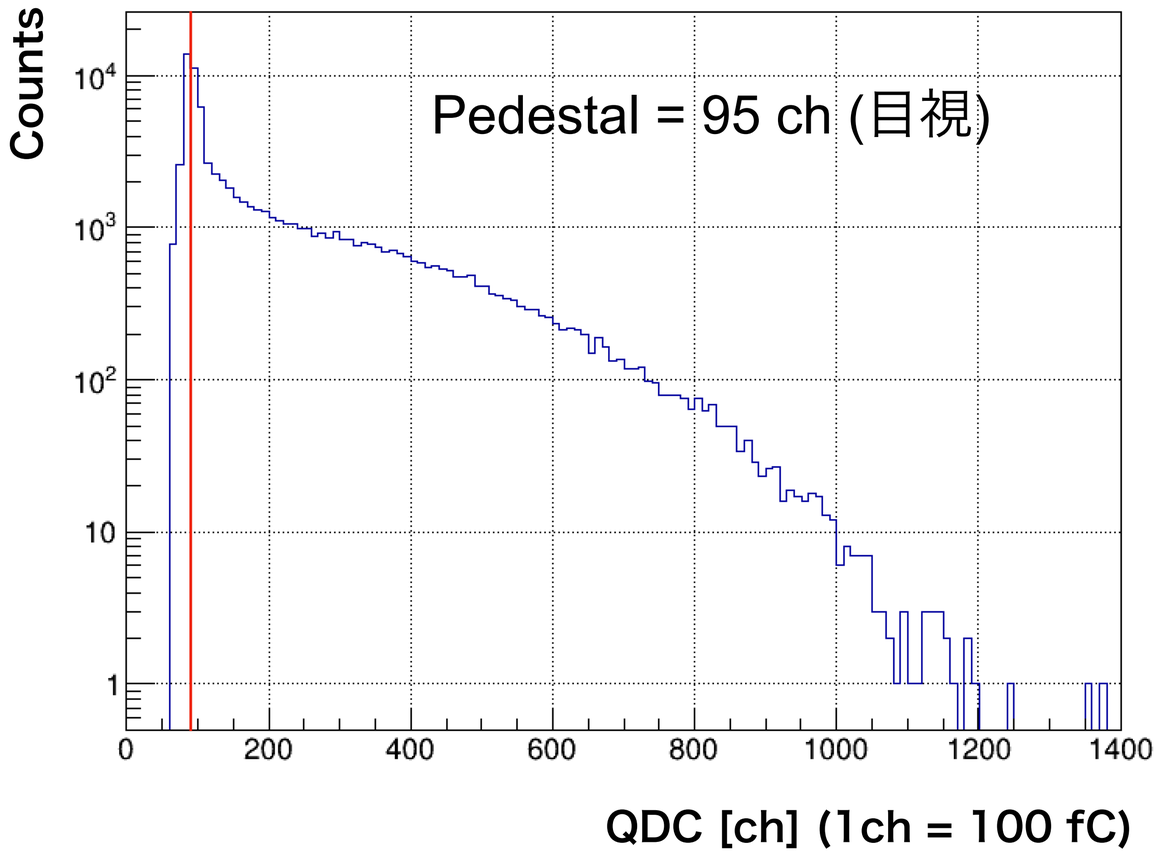
- Typical Histograms
- Run020 : 2300 V
- $^{90}$Sr, Ar-CO2 (87:13), length 10 cm

Trigの方でpedが見えてる、おかしい。

Trigger Scinti



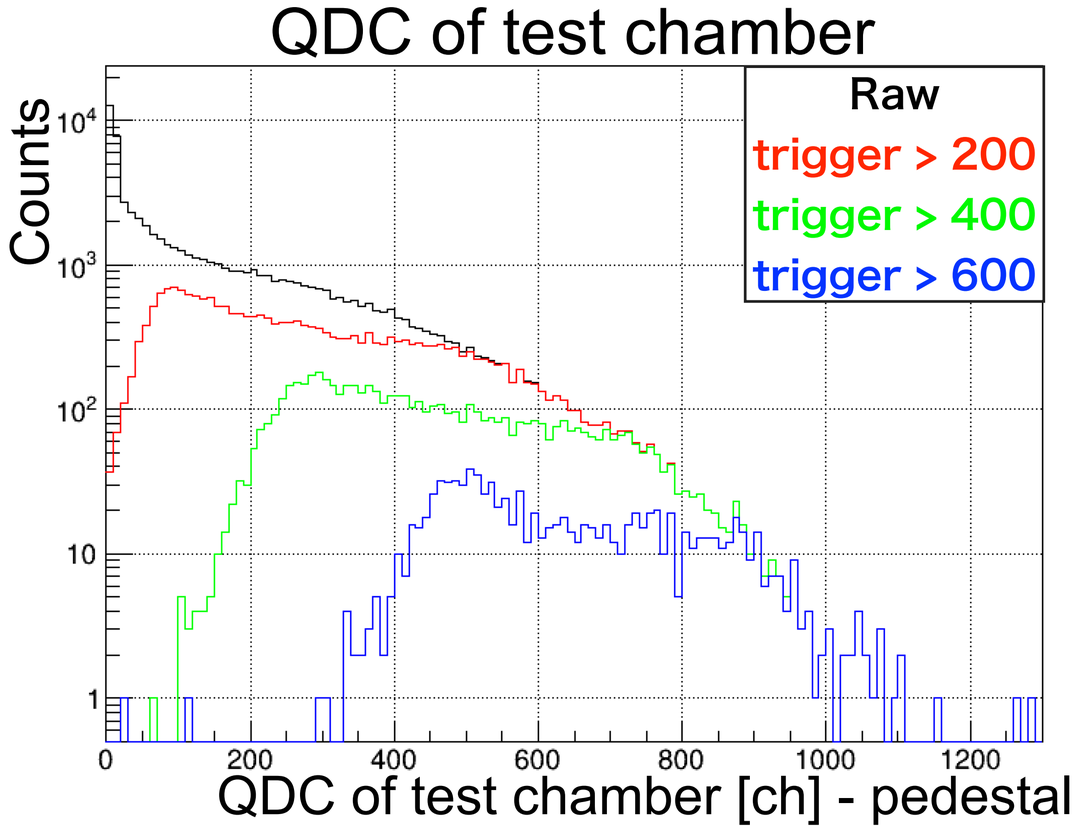

Test Chamber

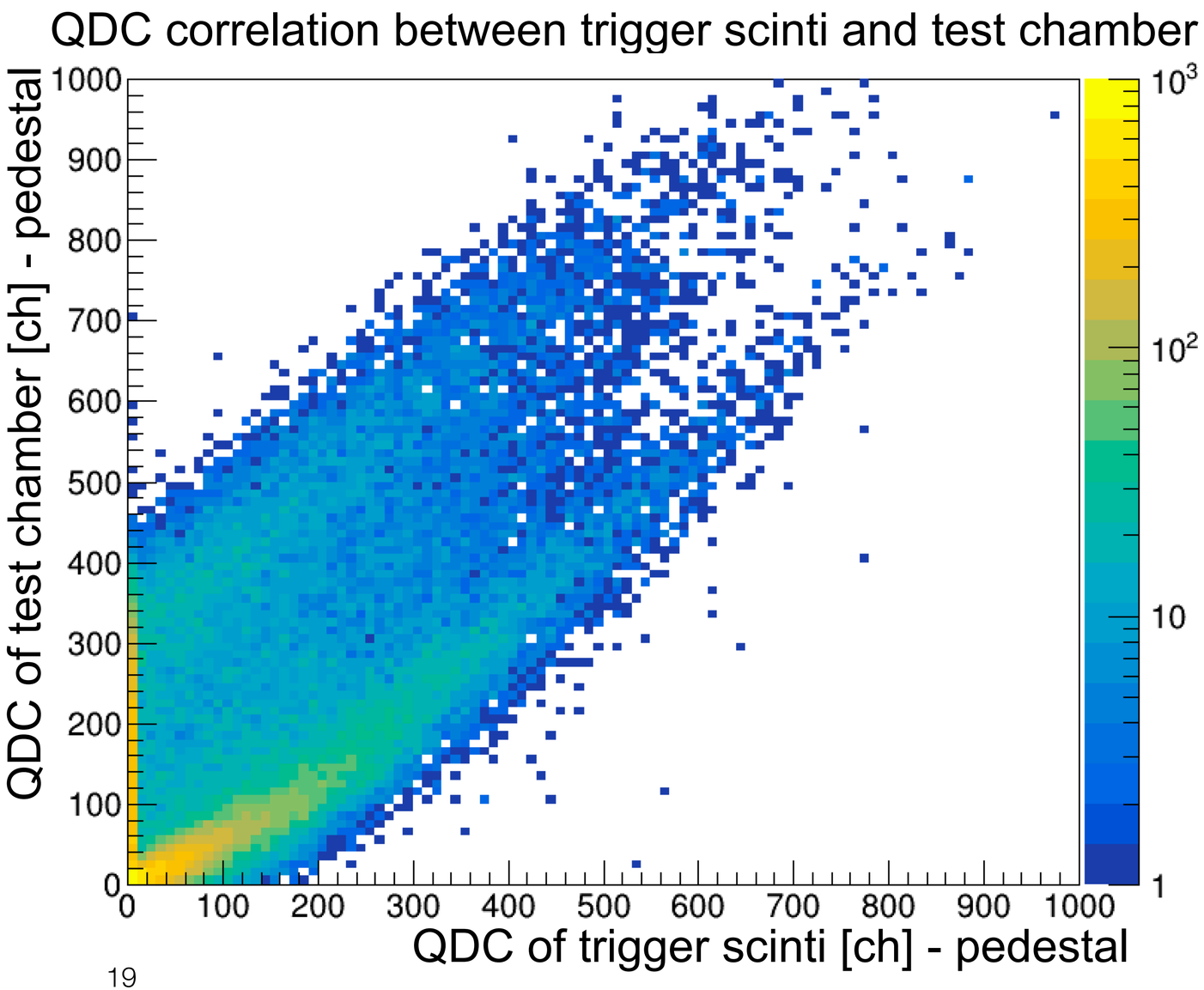


QDCデータの典型例。な〜んか２成分ある。

# Test Chamber : QDC data taking

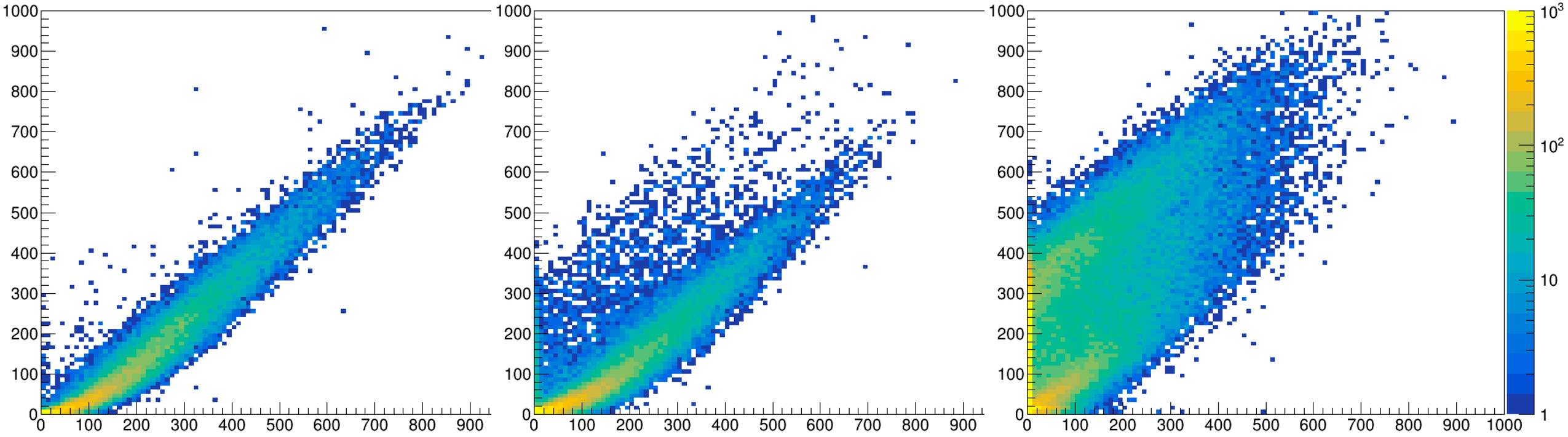
- Typical Histograms
- Run020 : 2300 V
- $^{90}$Sr, Ar-CO2 (87:13), length 10 cm



# Test Chamber : QDC data taking

- 2000, 2200, 2400 V
- $^{90}$Sr,  Ar-CO2 (87:13),  length 10 cm

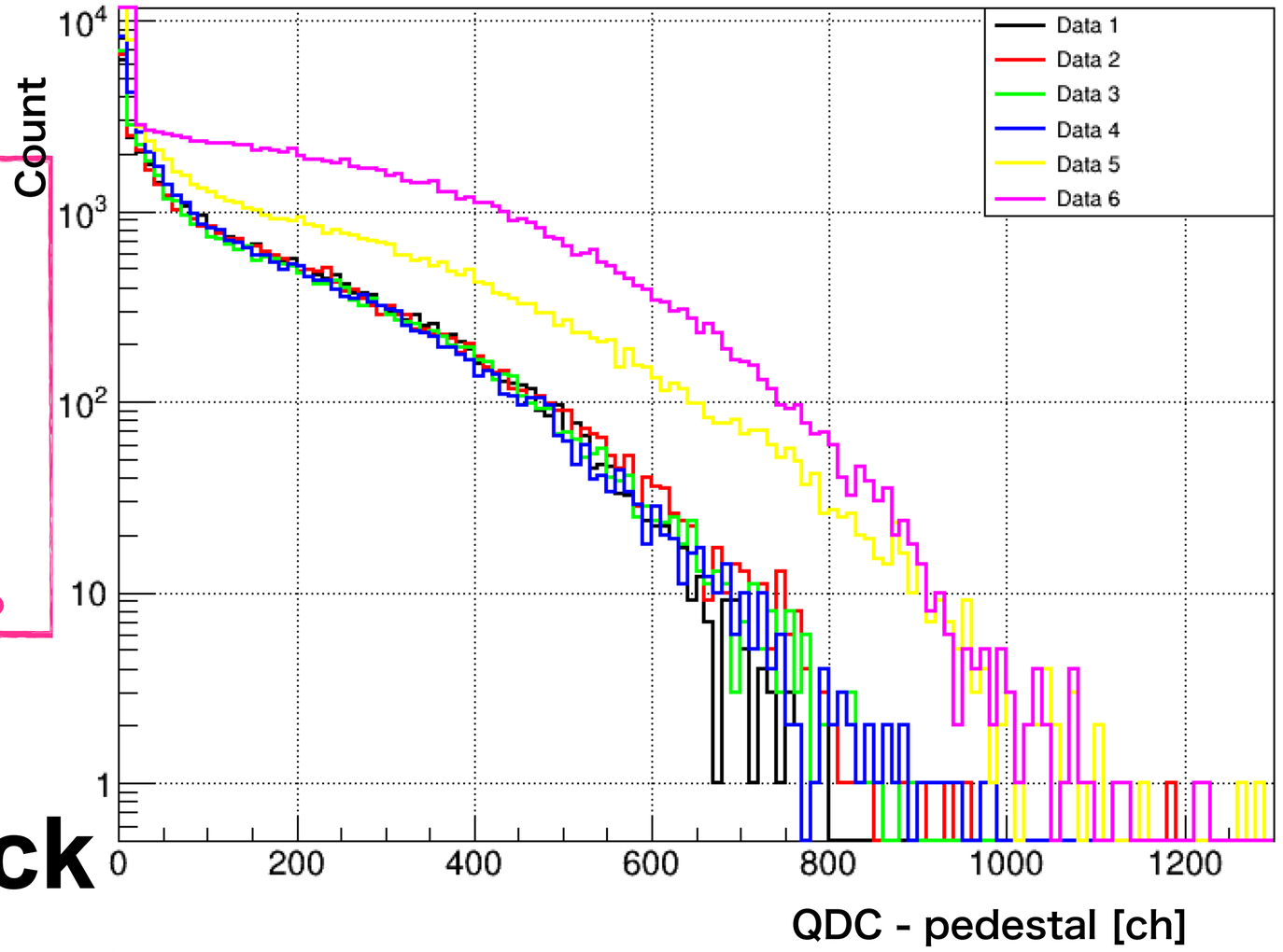



やはり2成分ある。サチってるからか？それともアフターパルス？わからん。

# Test Chamber : QDC data taking

- 1900, 2000, 2100, 2200, 2300, 2400 V
- $^{90}$Sr, Ar-CO2 (87:13), length 10 cm

QCD of test chamber at each HV point




**QDCのHV依存性の提示。**

**1900~2200Vまで**

**なぜか変わらないスペクトル。**

**2300Vで急に大きくなる。**

**2400Vでなぜかtailの位置が変わらない。**

➡ **よくわからない**

**90Srのオシロをcheck**

# Status of my Master Thesis

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i

この辺りを肥やした

今週はこの辺りを、
構成を改めて考えつつ書いてしまう

# This Week

- Continue the E80-CDC's commissioning
- Take data of test chamber with ArCO2 (70:30, 80:20, …)
  - 90Sr oscillo check
  - And different positions putting radiation source
  - TDCも
- Write my master thesis (CDCの原理あたりを)