

*CDC ArCO₂ Study in Aug. 2024
to check its feasibility*

1

Check HitPat, TDC, TOT, Multiplicity

Used Run & Condition

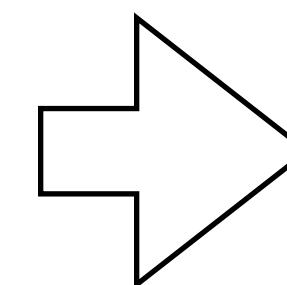
44	2350	747491	9:54:00	2024/8/1	10:06:41	20:00:00	E73, #9	157	GIO scaled
45	2400	236613	3:09:00	2024/8/1	20:05:34	23:14:00	E73, #9	158	GIO scaled
46	2375	518986	6:52:07	2024/8/2	10:05:53	16:58:00	E73, #9	158	GIO scaled

- Online Trigger ; CDH Cosmic (with All Seg) <— same as beam time cosmic
- Removed Scaler from DAQ data node? (Due to its wrong busy)
- ASD <— same as beam time cosmic
 - U-V_{th} 1.50 V, D-V_{th} 1.50 V
 - U-V₊ 3.55 V, D-V₊ 3.65 V
 - U-V₋ 3.39 V, D-V₋ 3.39 V
- Gas Flow <— I have no idea how to compare it to ArC2H6
 - Ar : CO₂ = 90 : 10
 - In ?? SCCM, Out ?? SCCM (Mass Flow Meter)
- Temperature inside CDC ; ~ ?? °C <— same as beam time cosmic

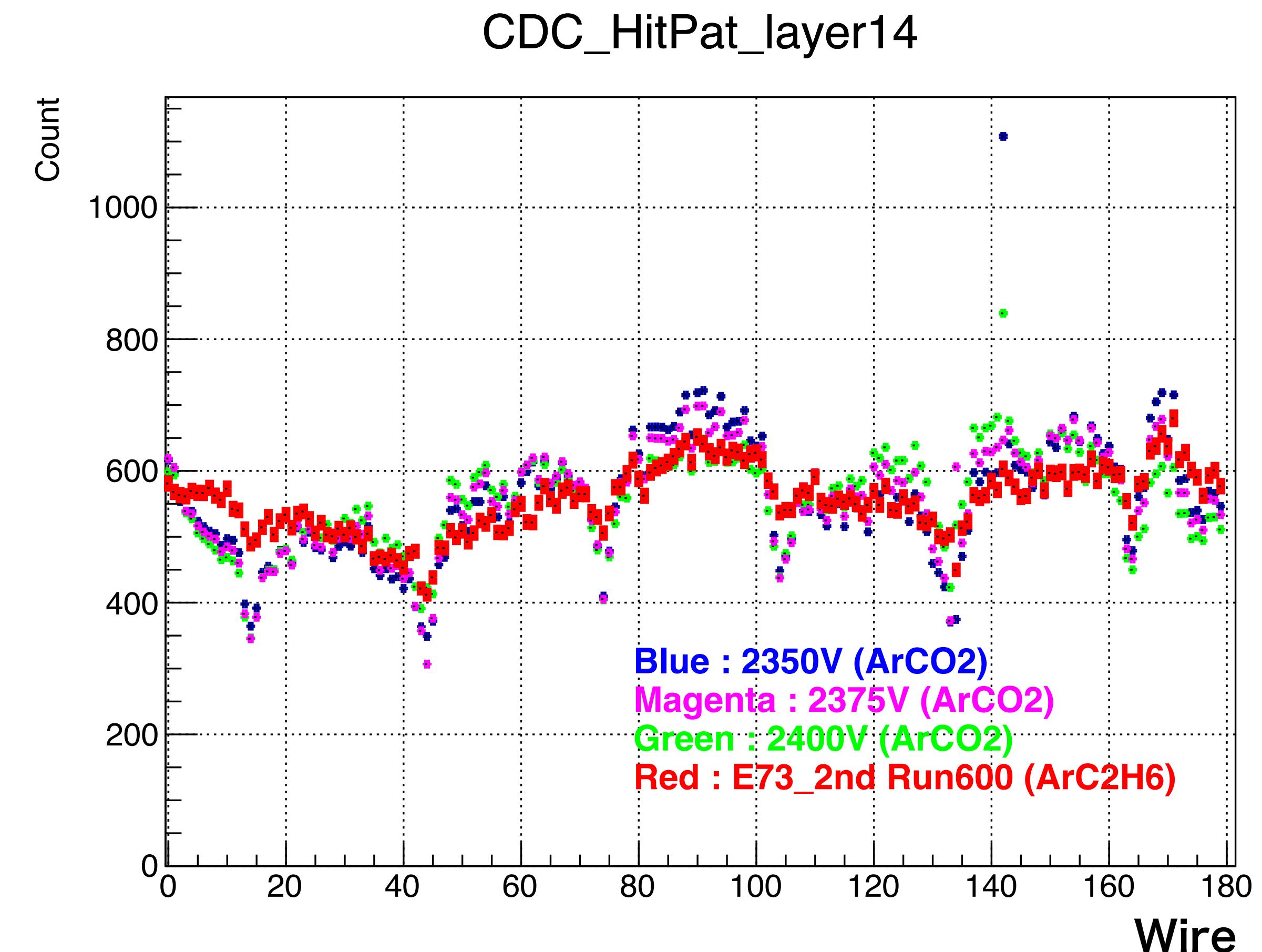
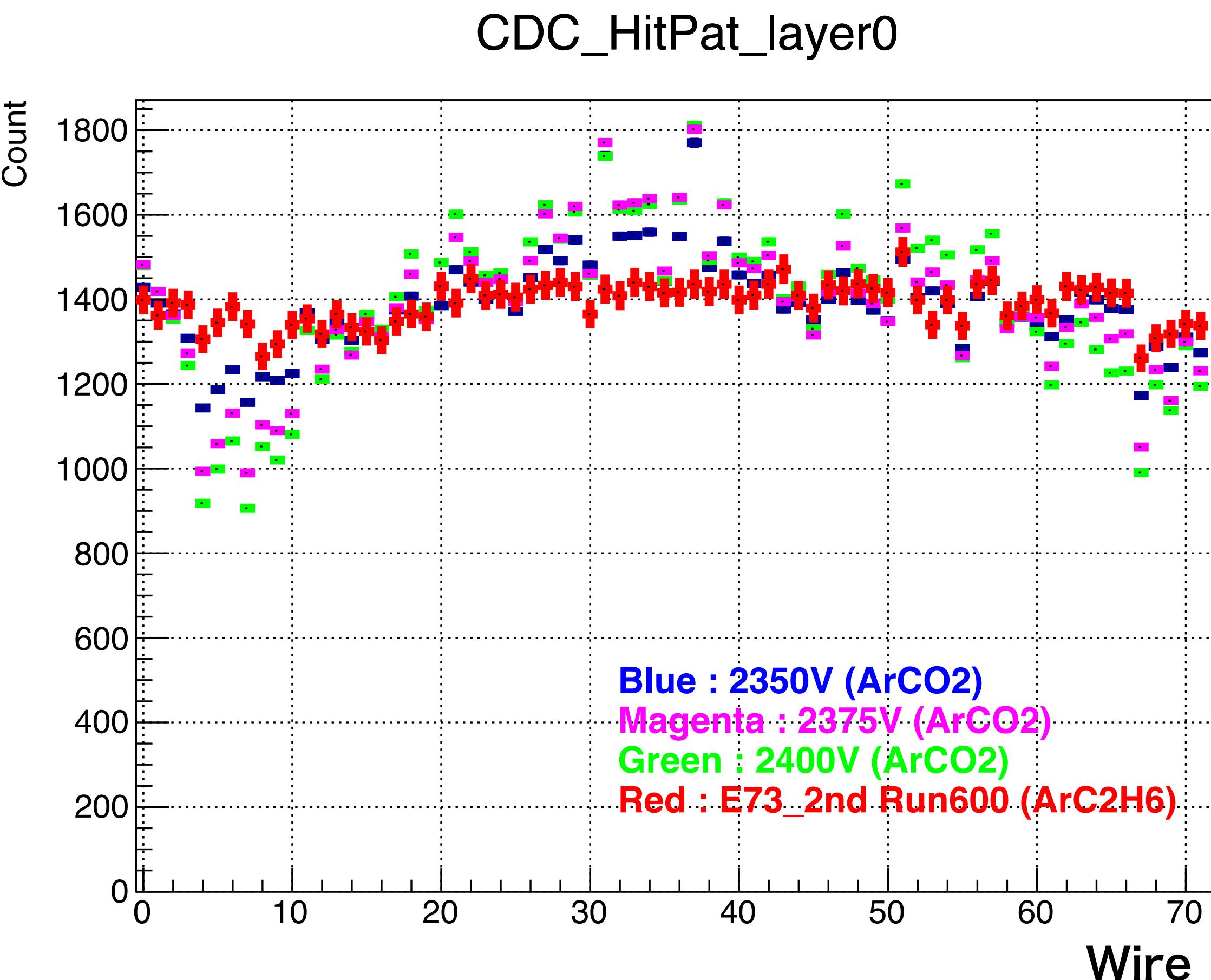


Hit Pattern of CDC (e.g. Layer 0 & 14)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events
- Big gap between noisy and not noisy wires in ArCO₂
- But almost the same trend

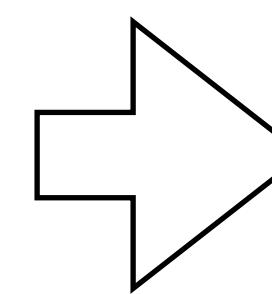


Seems to be working properly



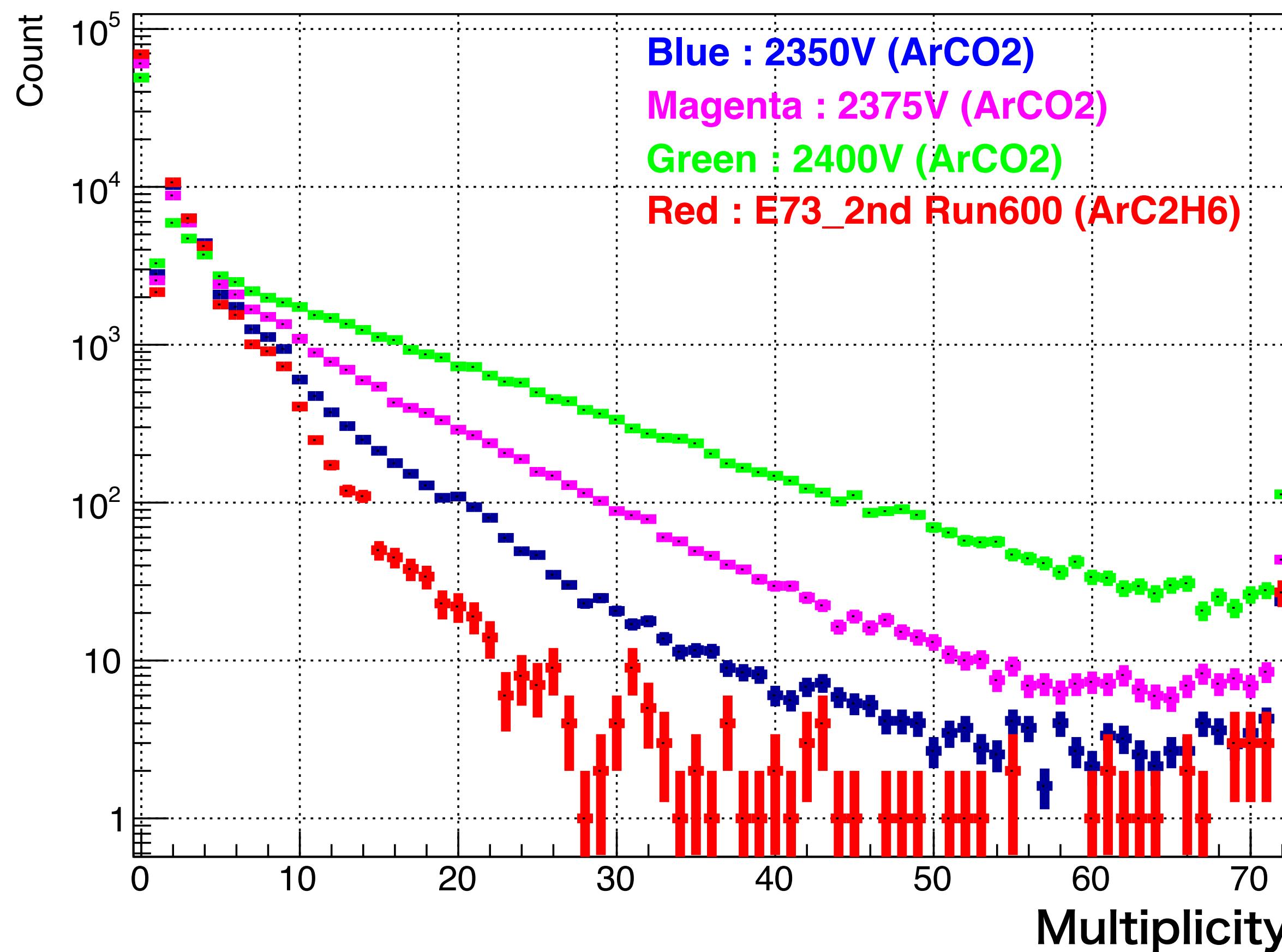
Raw Multiplicity of CDC (e.g. Layer 0)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events

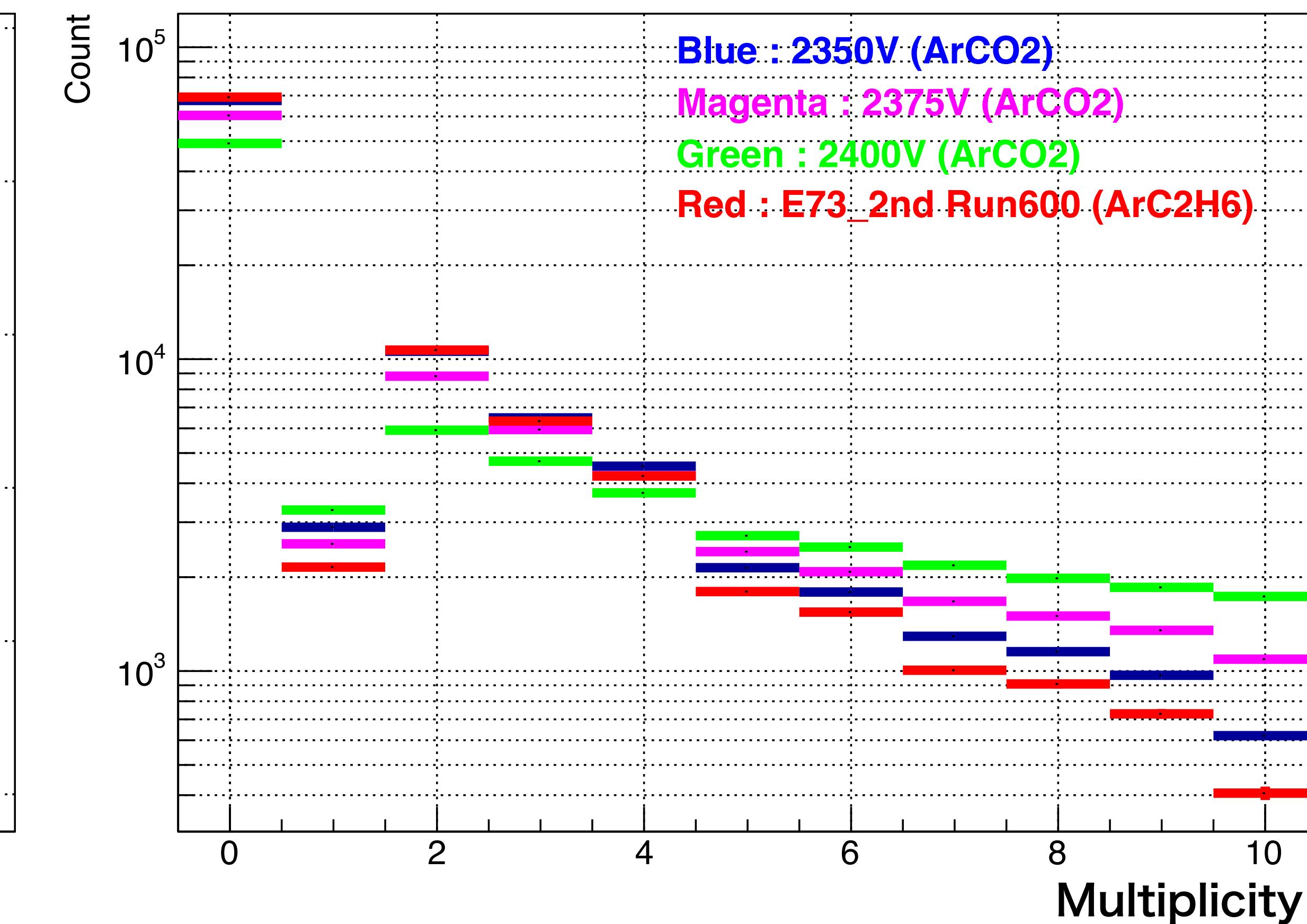


Overwhelmingly big multiplicity **on raw data level**

CDC_Mul_layer0



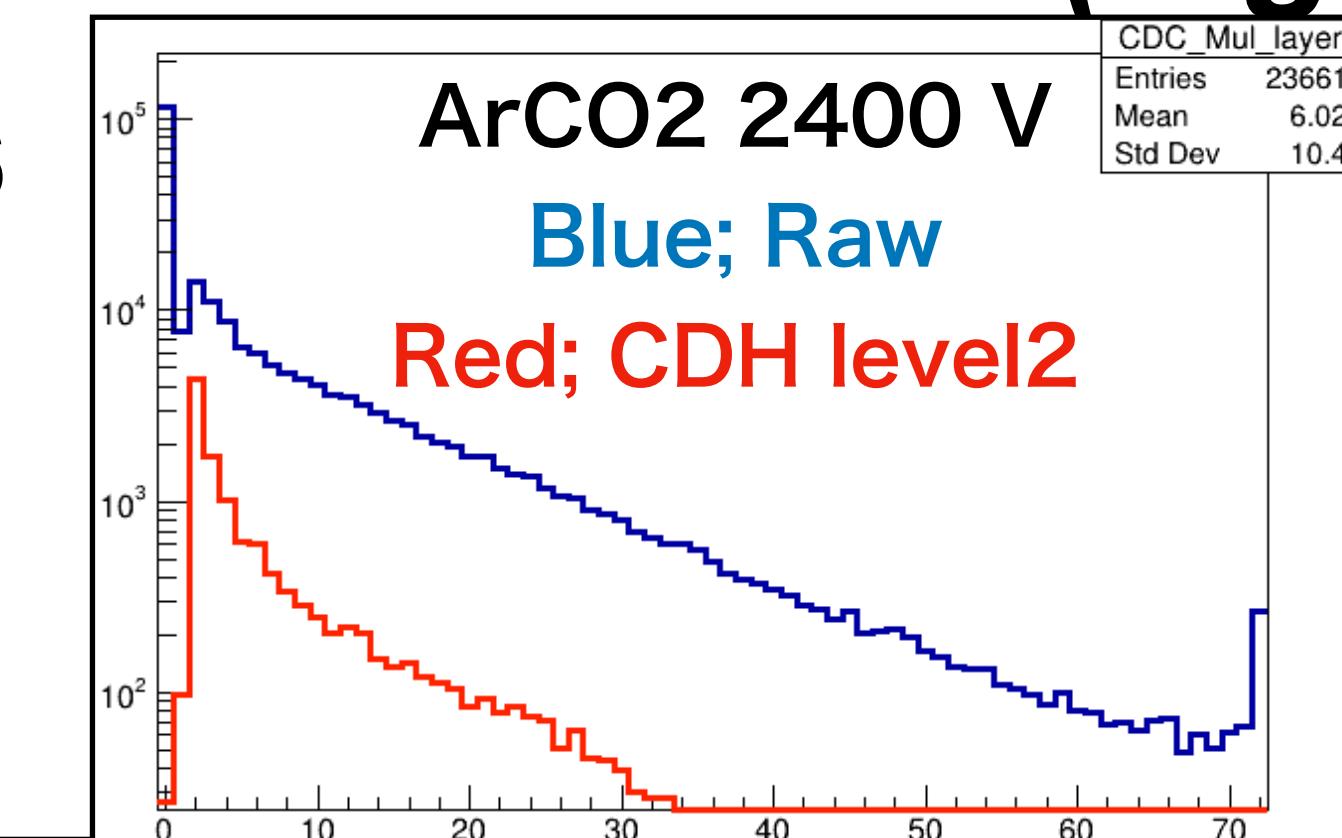
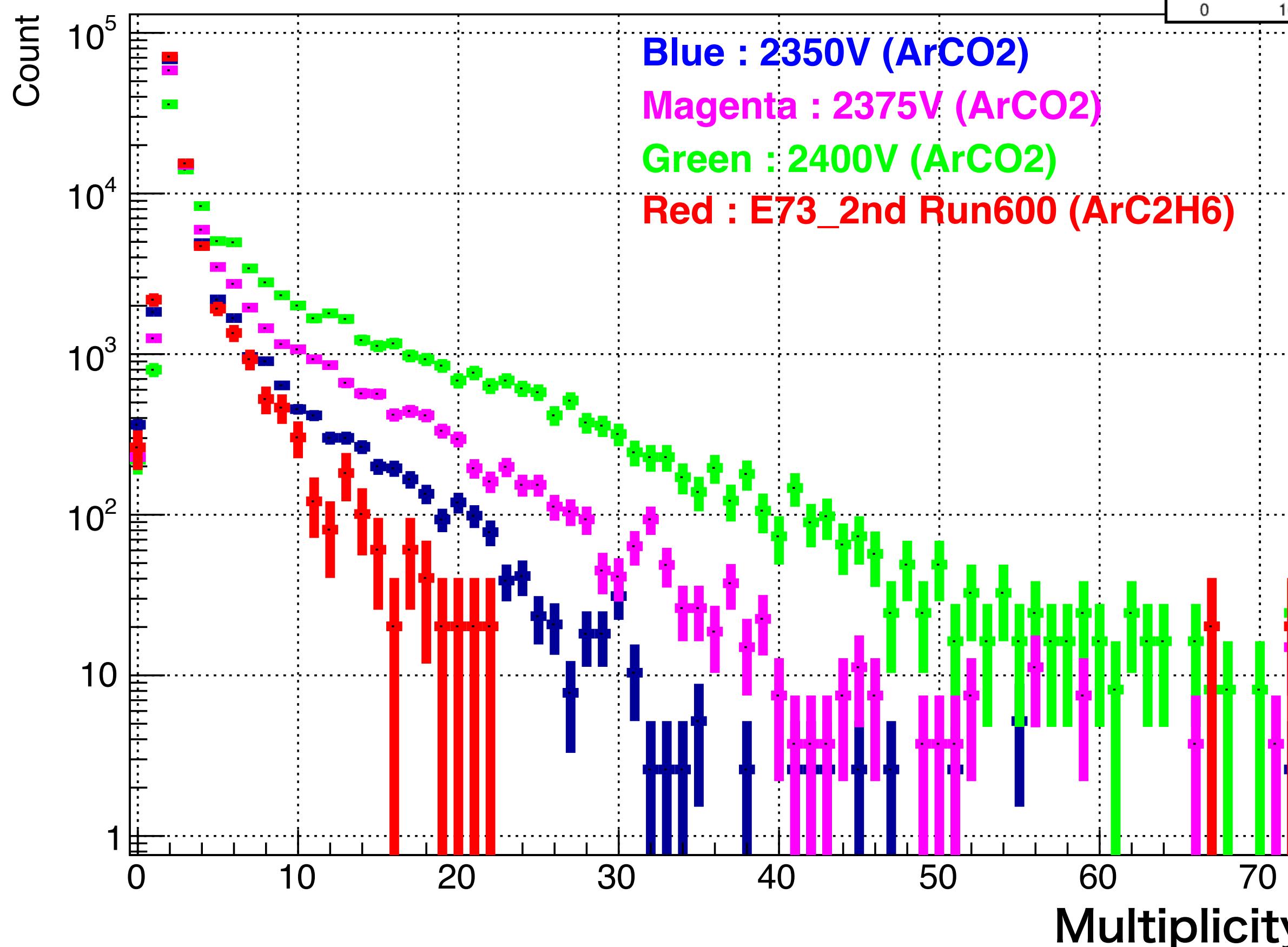
CDC_Mul_layer0 (Focus ver.)



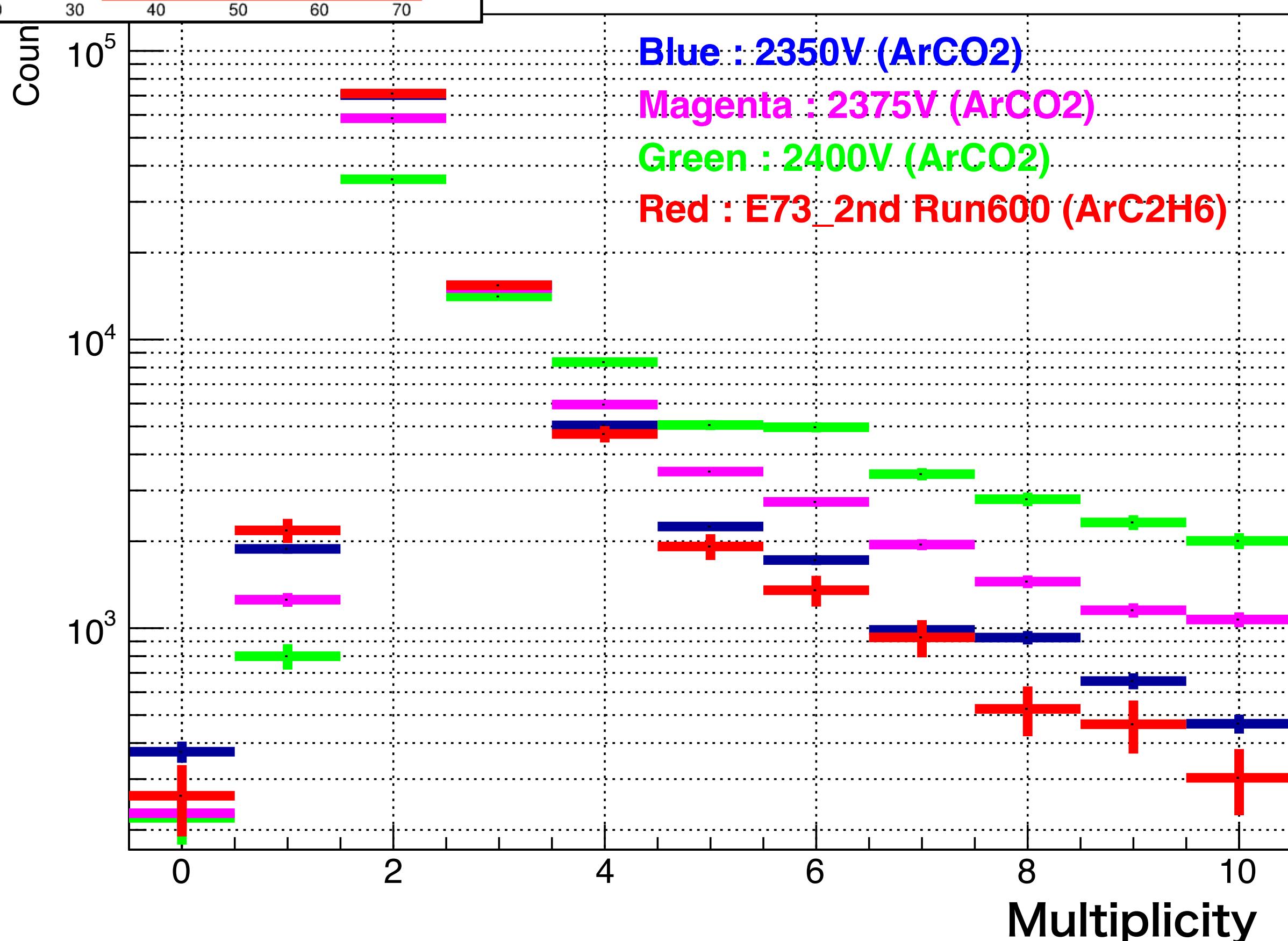
Multiplicity of CDC after event selection (e.g. Layer 0)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events
- Used CDH “level2” events

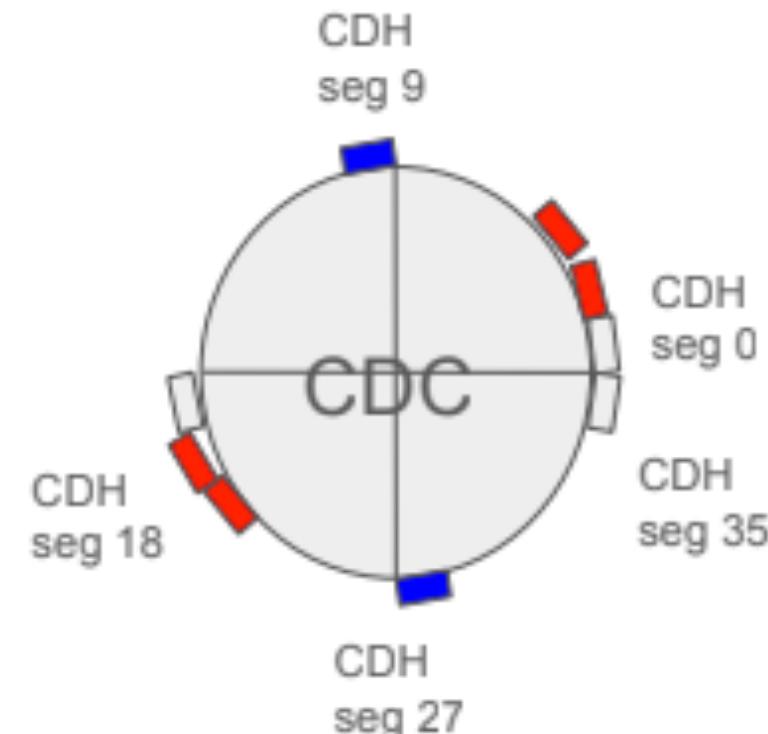
CDC_Mul_cdh_level2_layer0



_Mul_cdh_level2_layer0 (Focus ver.)

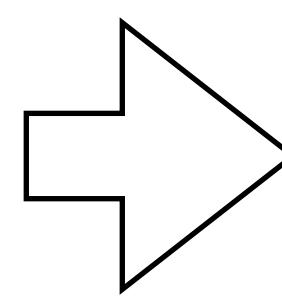


examples of level2 and level1



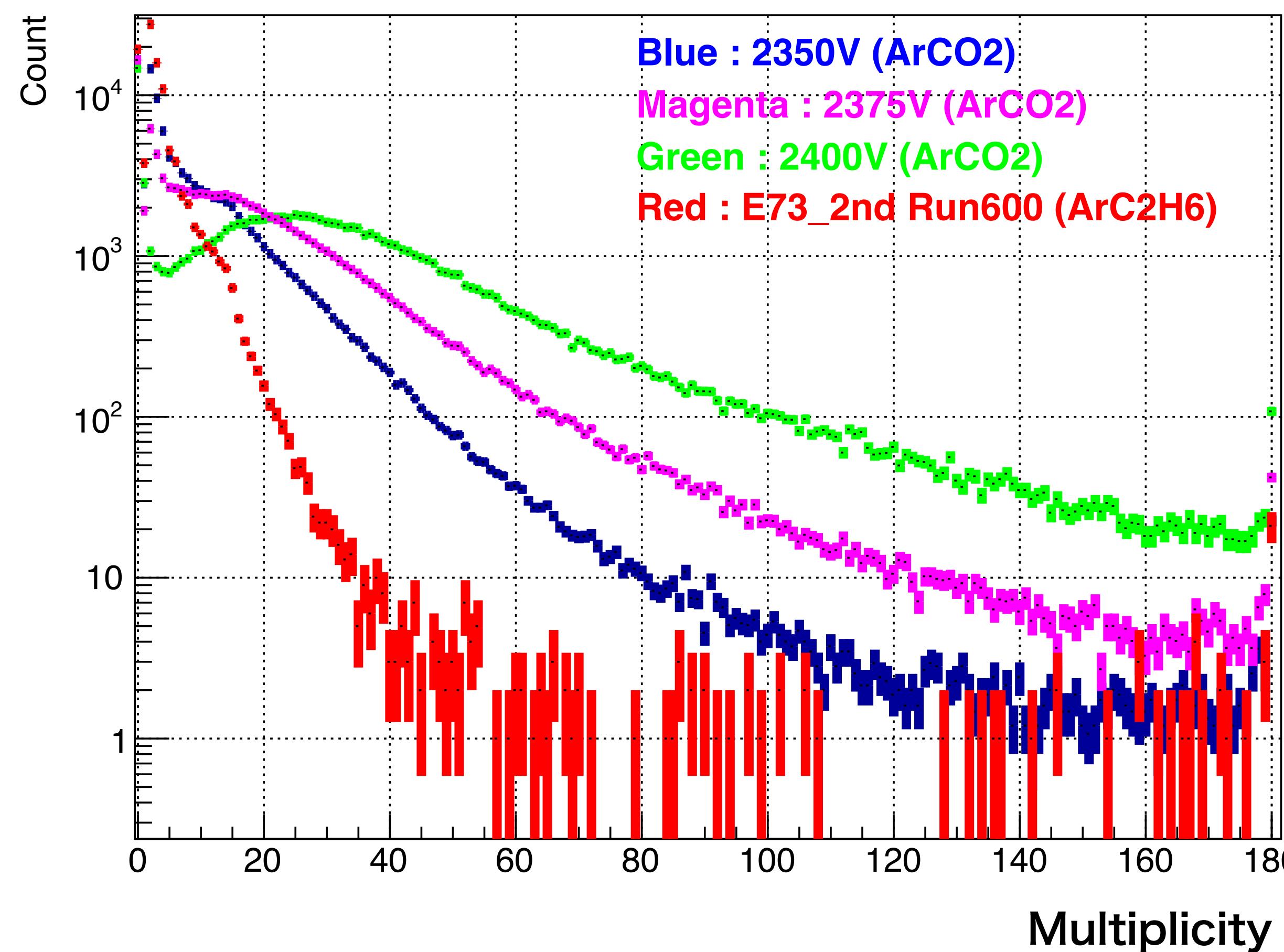
Raw Multiplicity of CDC (e.g. Layer 14)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events

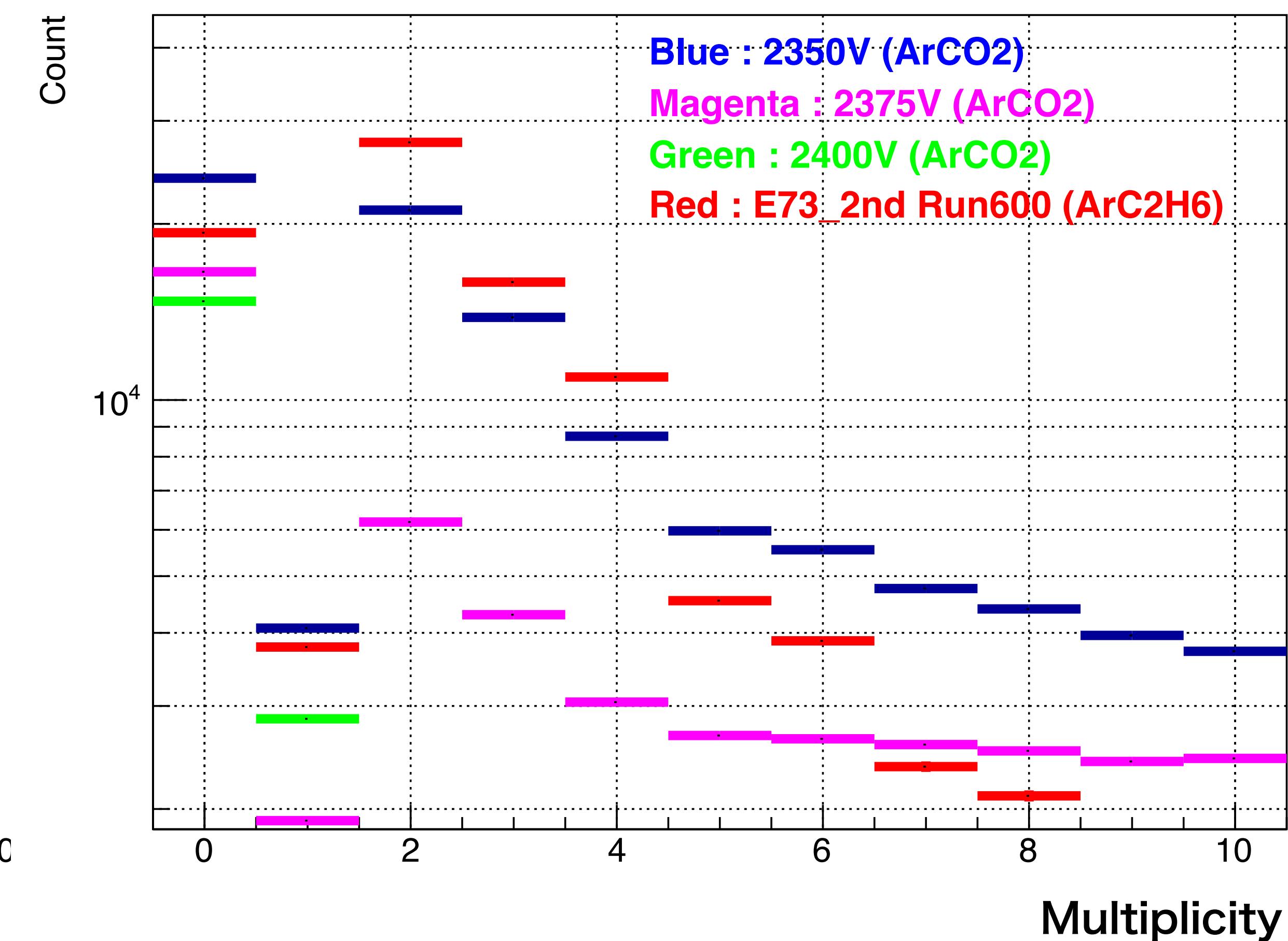


Overwhelmingly big multiplicity **on raw data level**

CDC_Mul_layer14



CDC_Mul_layer14 (Focus ver.)

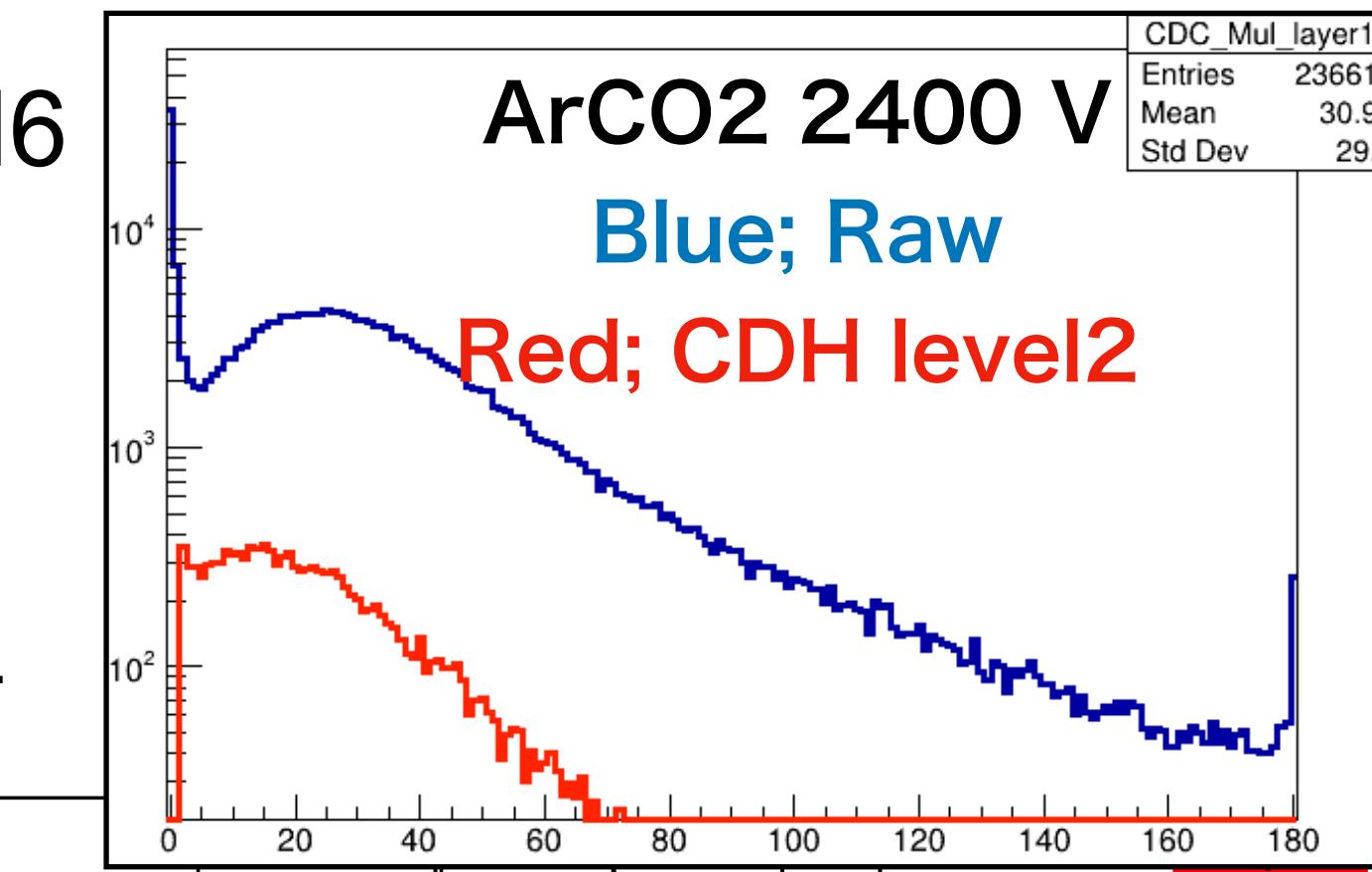
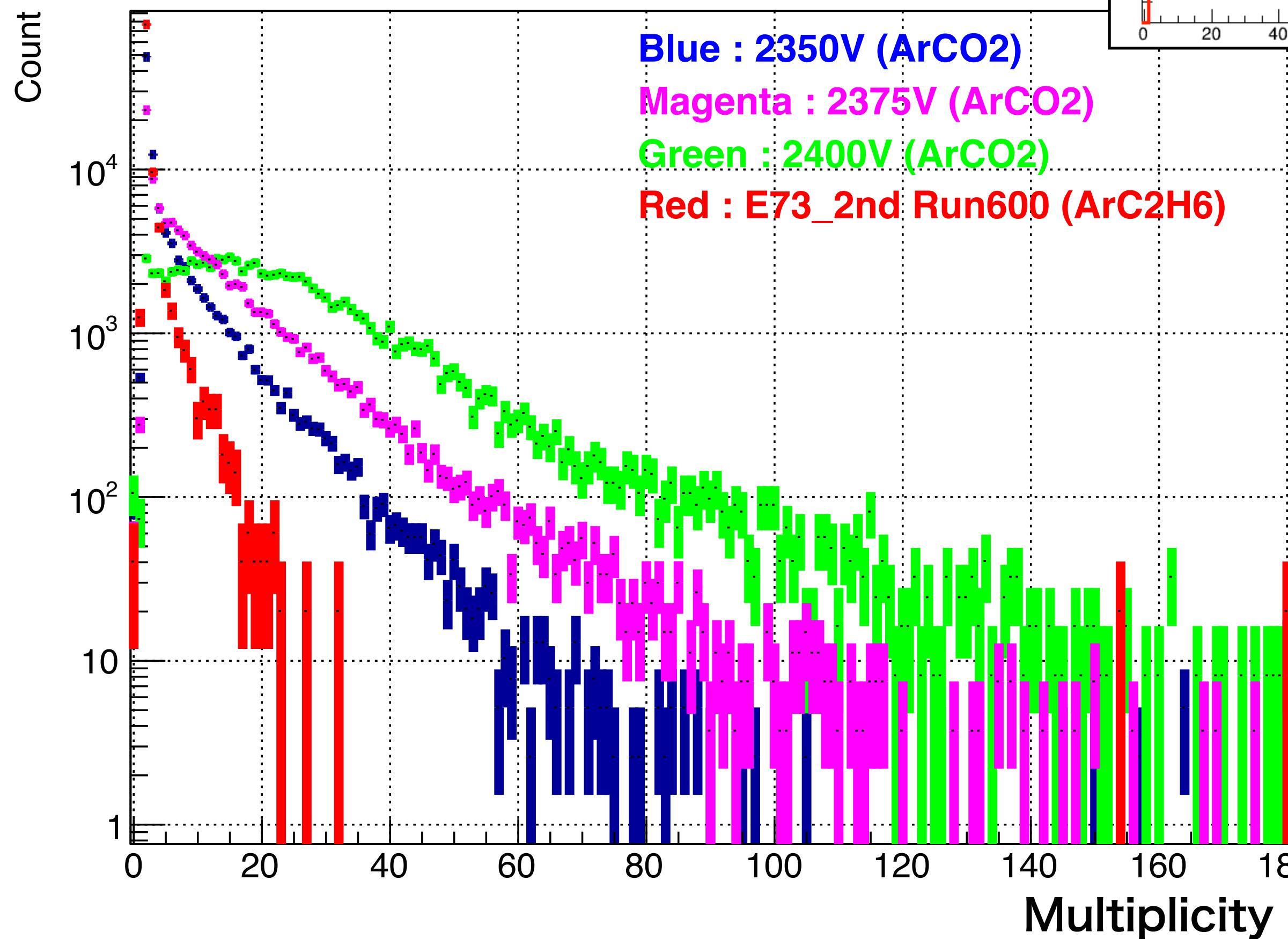


Multiplicity of CDC after event selection (e.g. Layer 14)

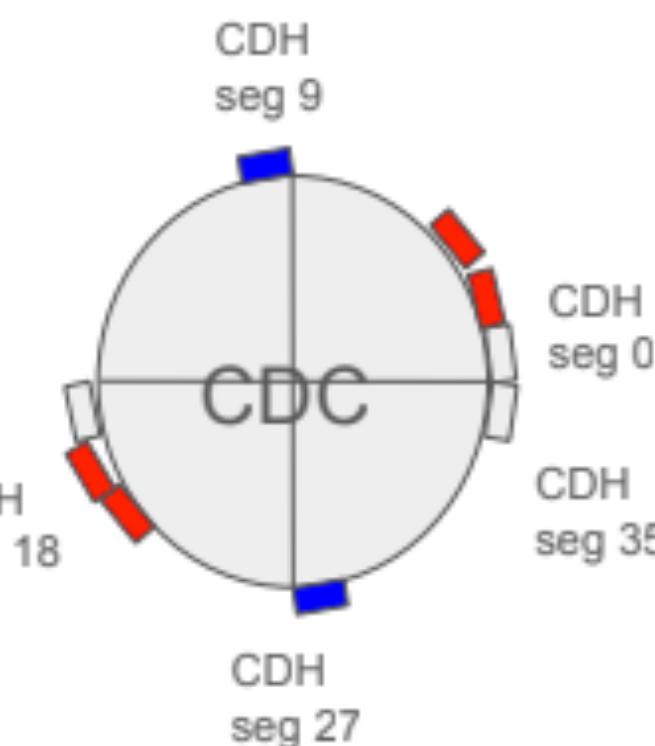
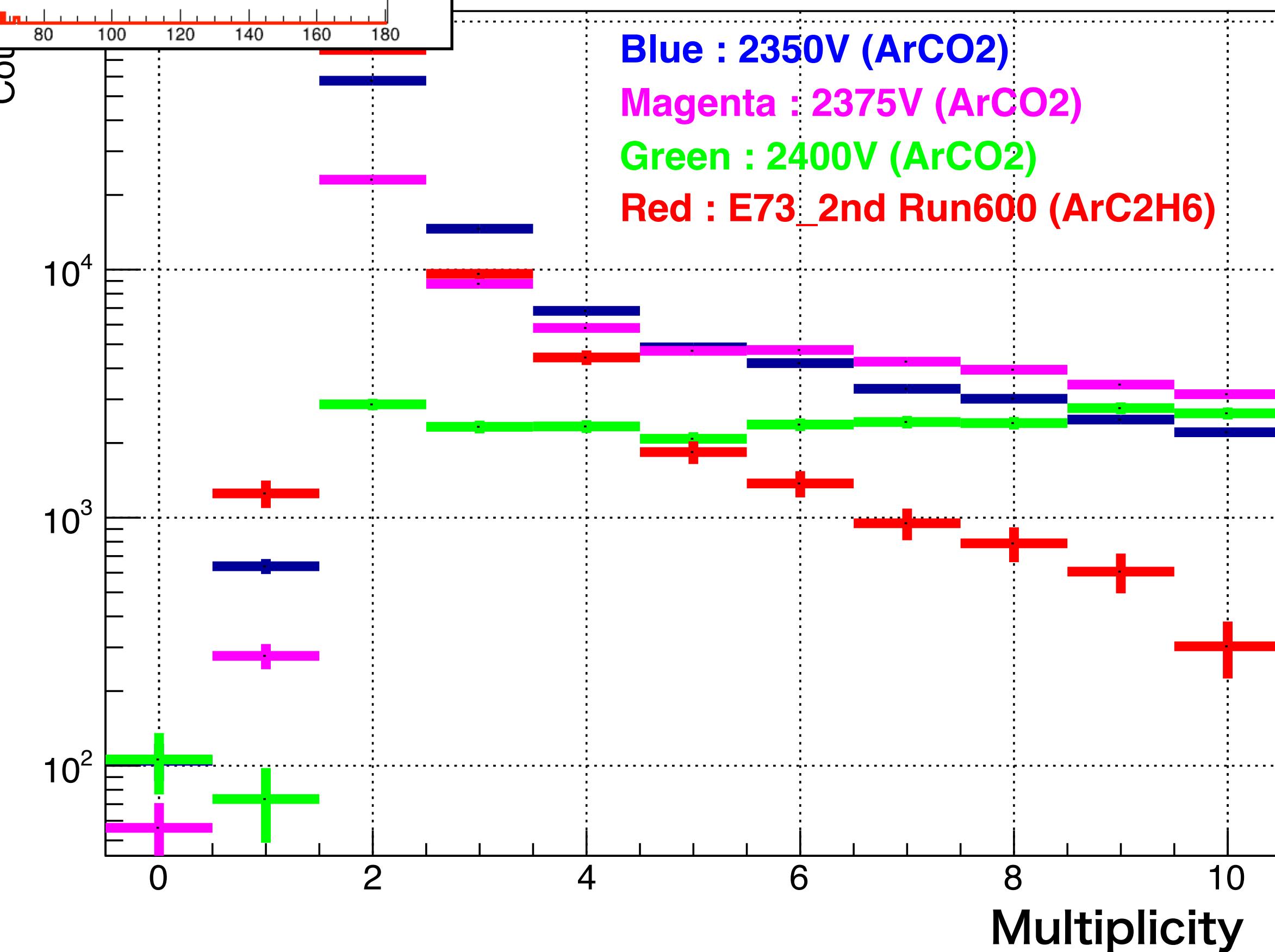
examples of level2 and level1

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events
- Used CDH “level2” events

CDC_Mul_cdh_level2_layer14



_Mul_cdh_level2_layer14 (Focus ver.)

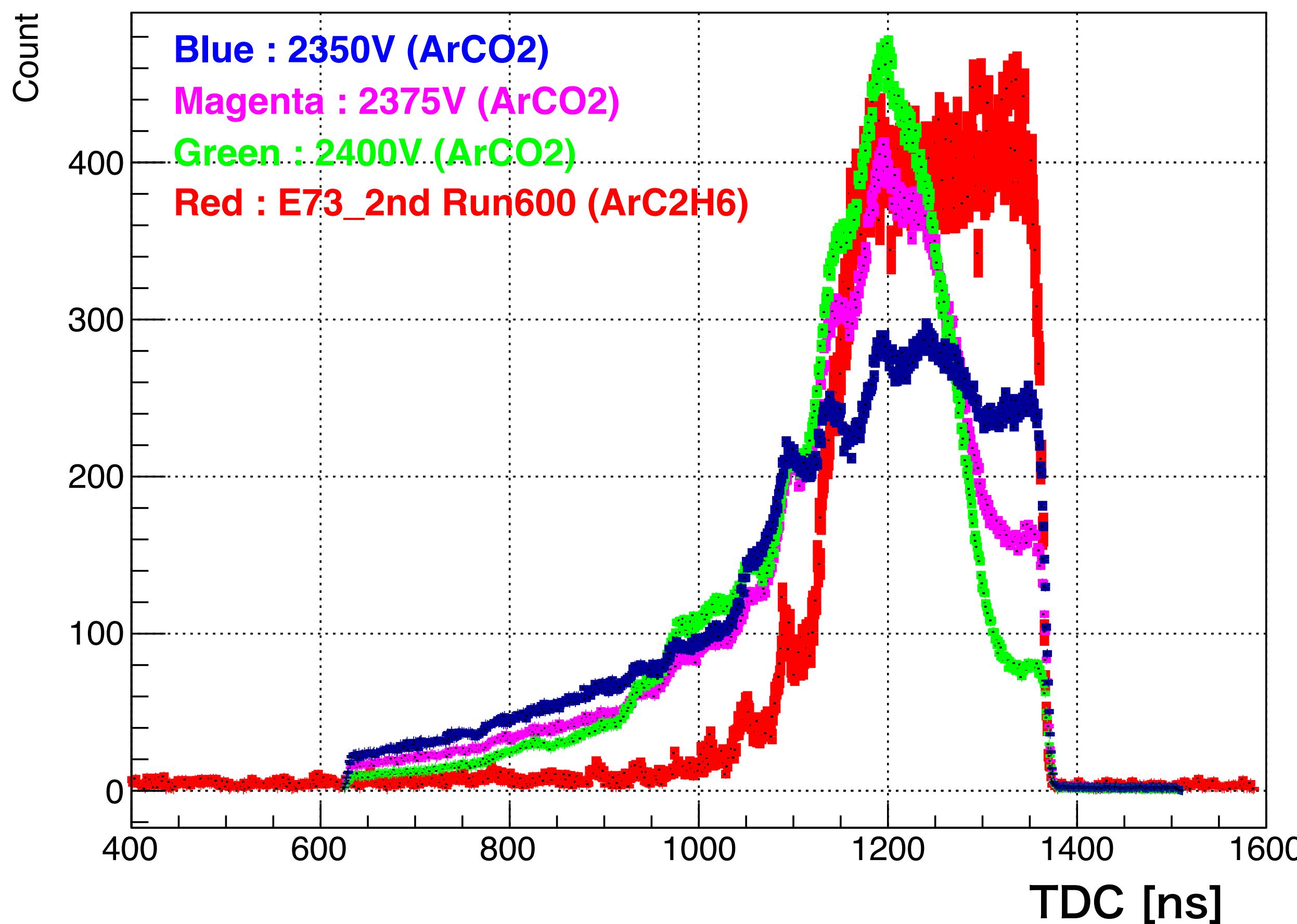


Raw Leading of CDC (e.g. Layer 0 & 14)

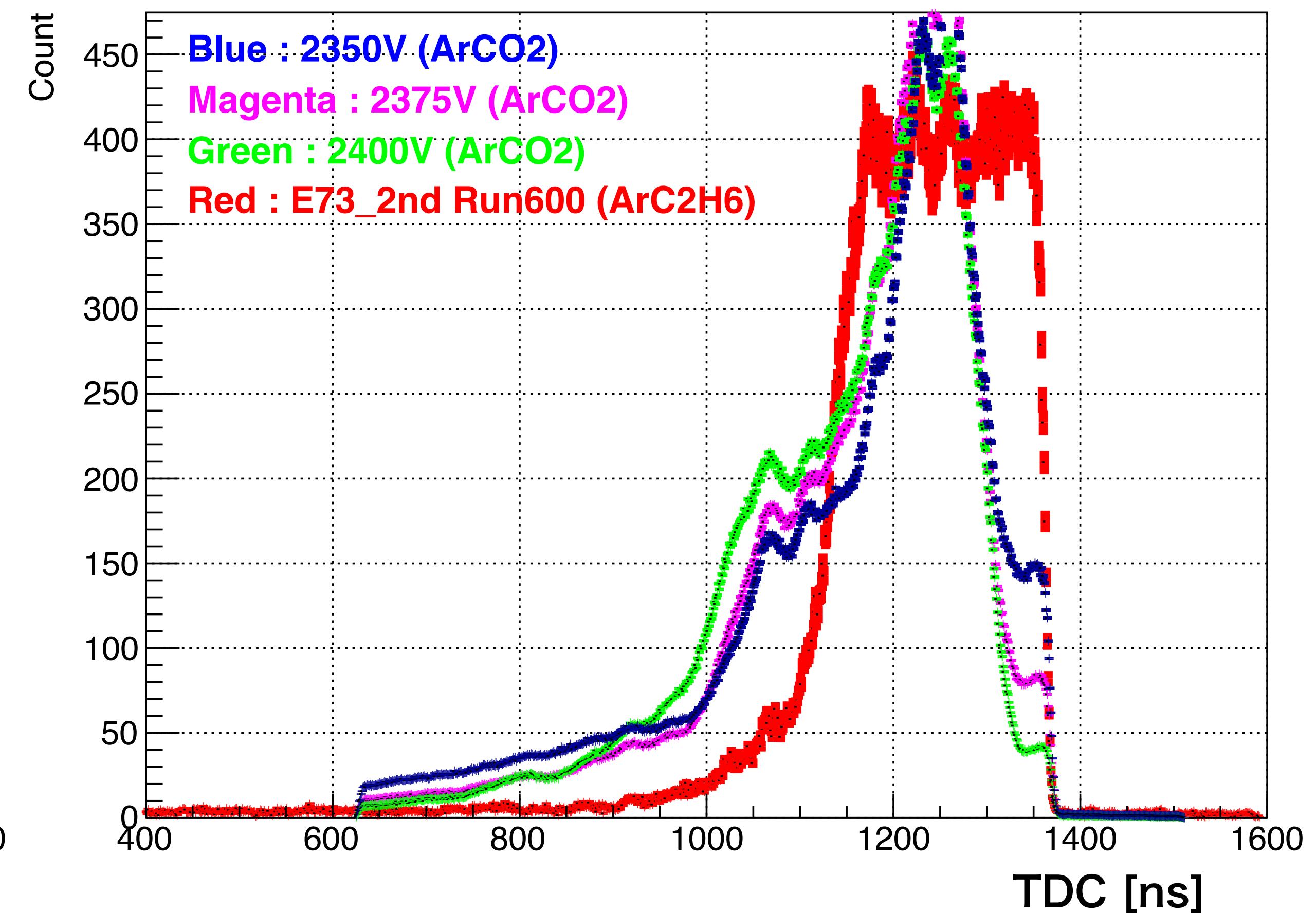
- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events

Too much garbage in ArCO₂

CDC_Leading_layer0

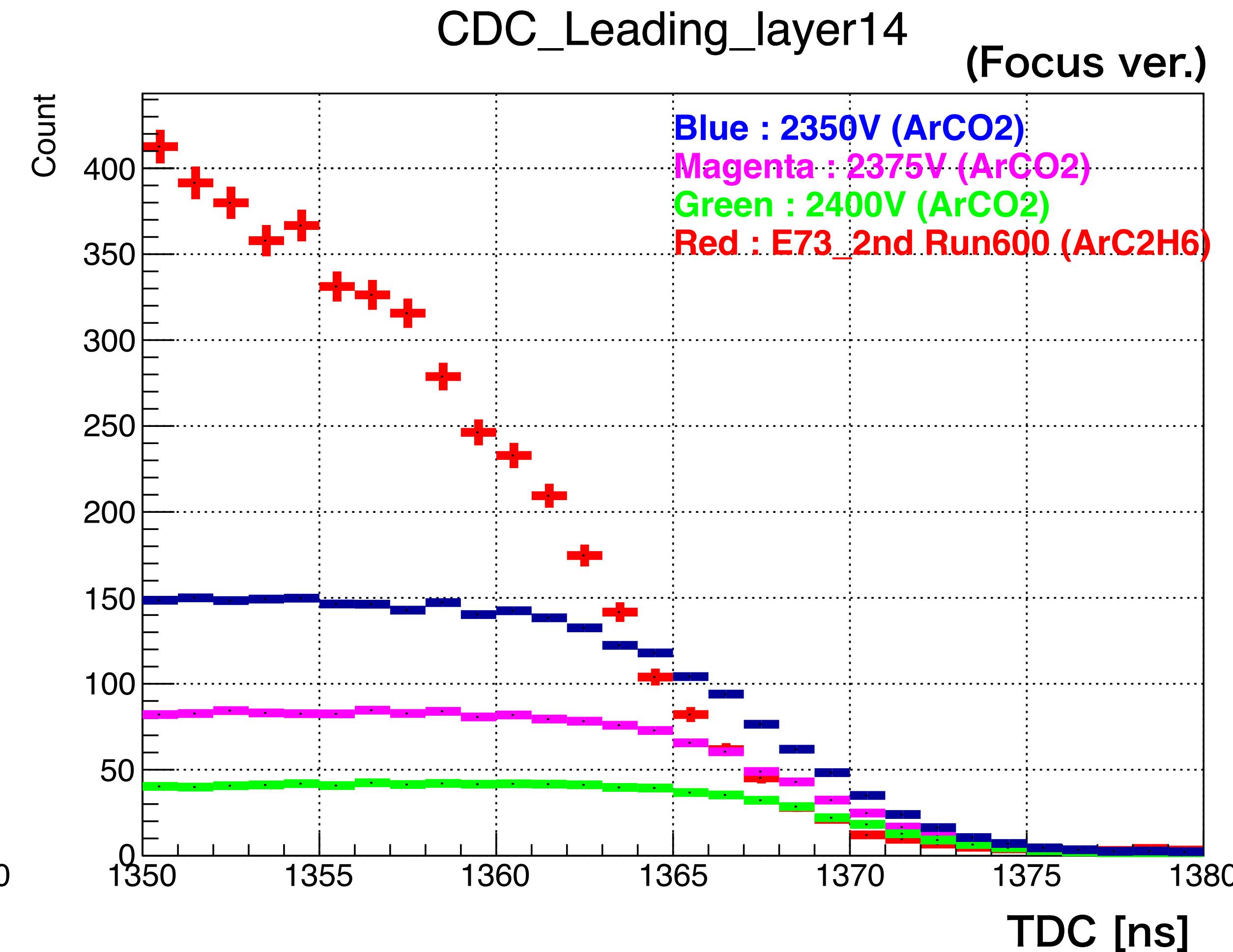
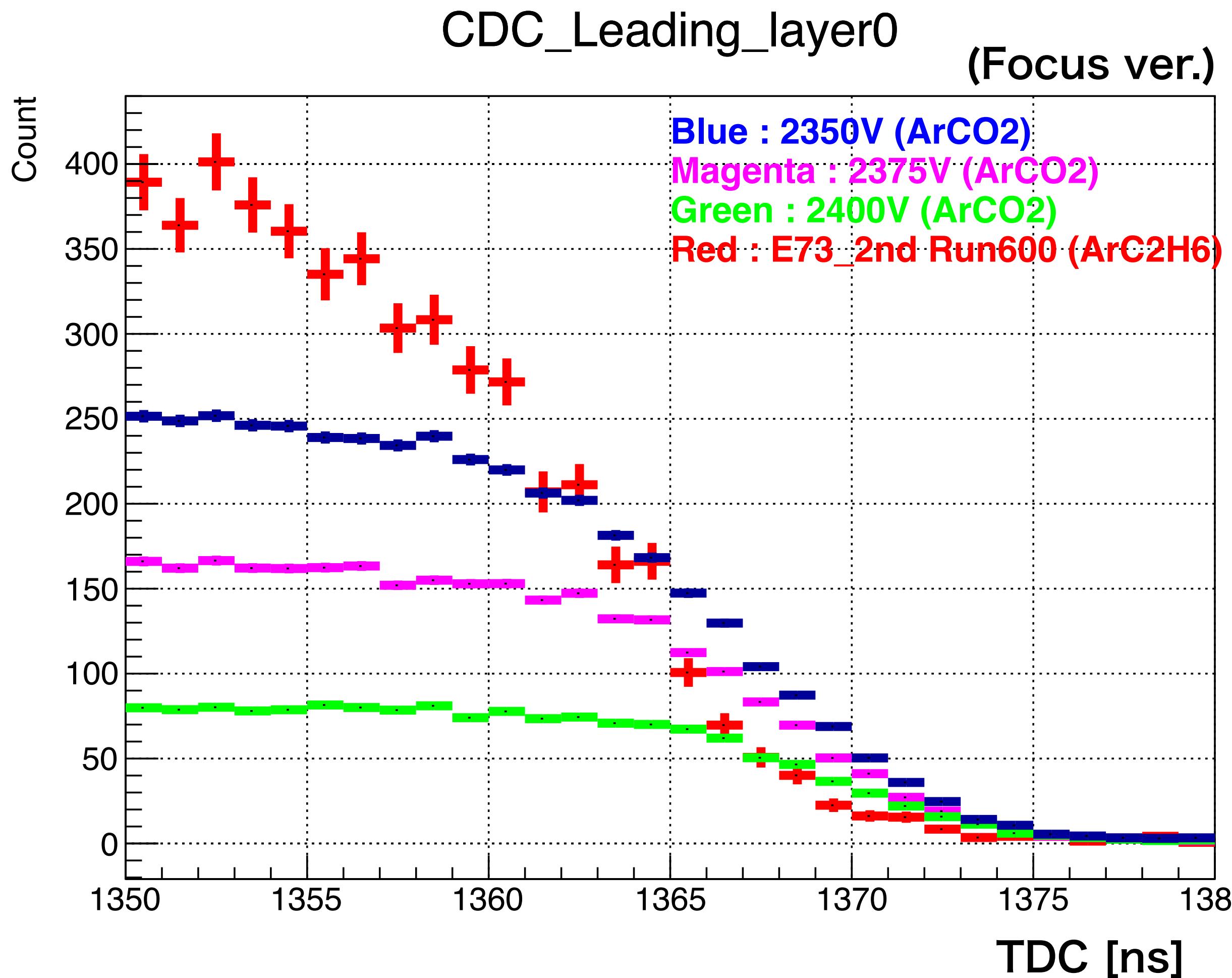


CDC_Leading_layer14



The rise of Raw Leading of CDC (e.g. Layer 0 & 14)

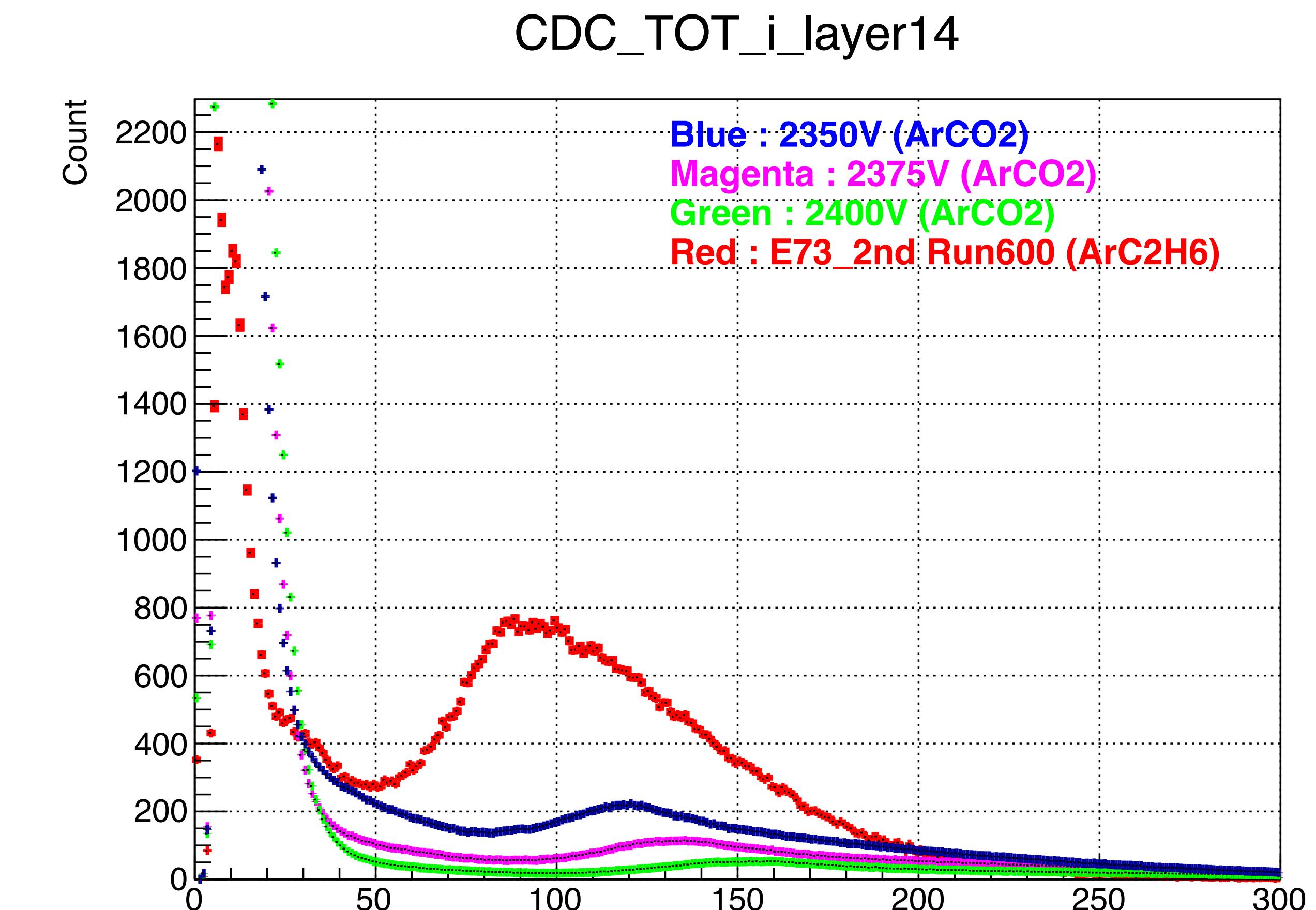
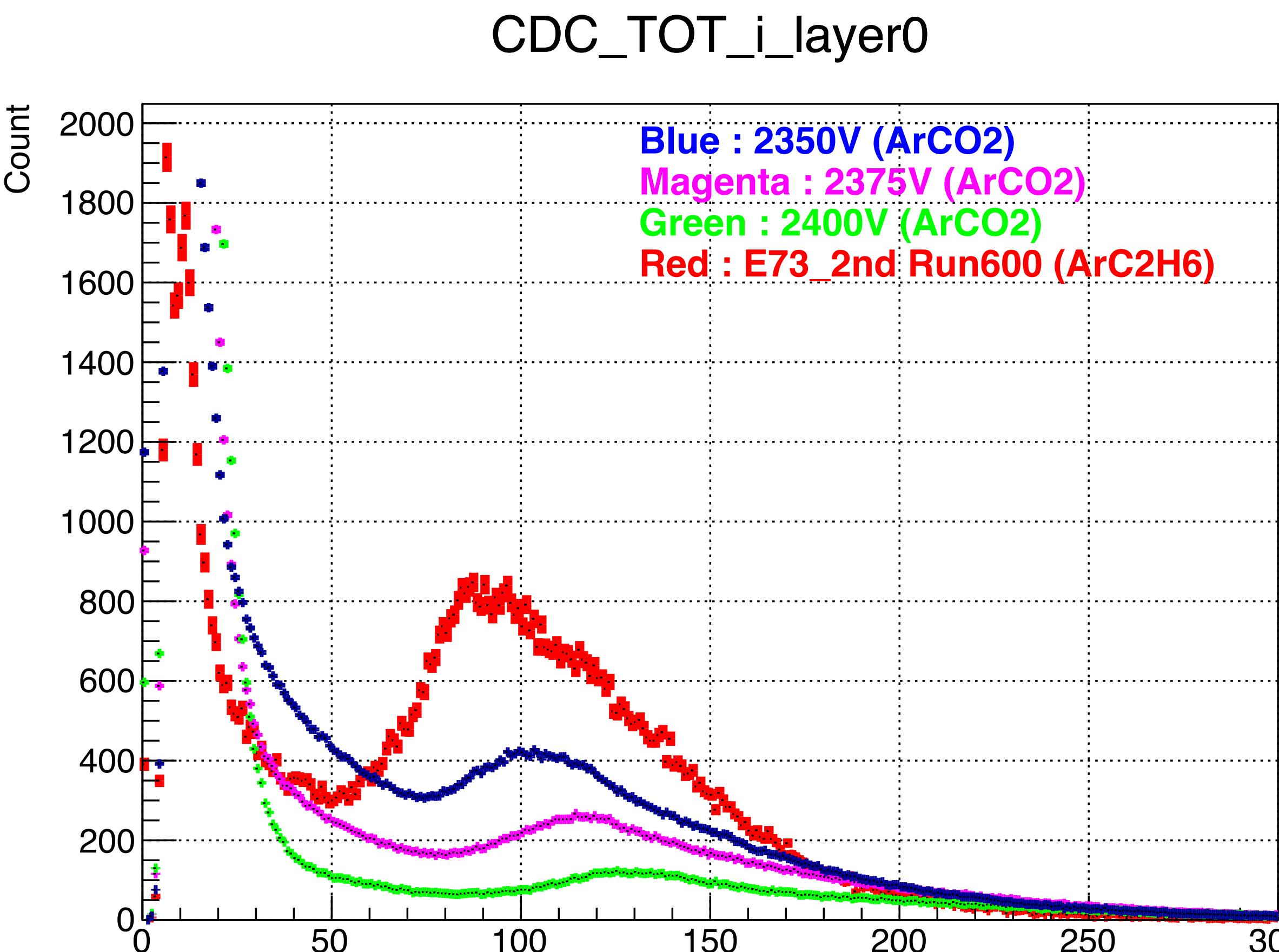
- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events
- ArC₂H₆ ; Concave up, ArCO₂ ; Concave down



Raw TOT of CDC (e.g. Layer 0 & 14)

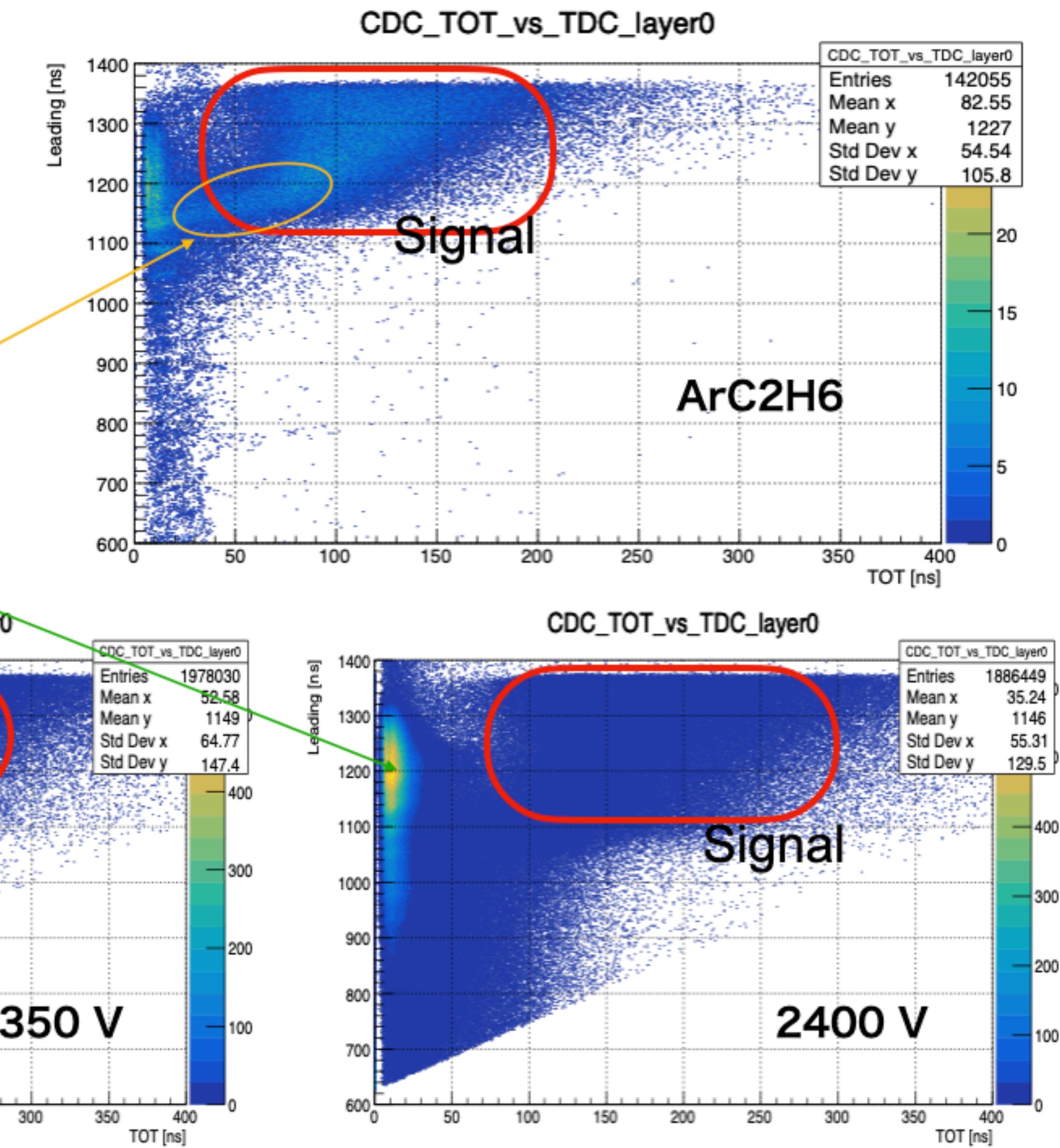
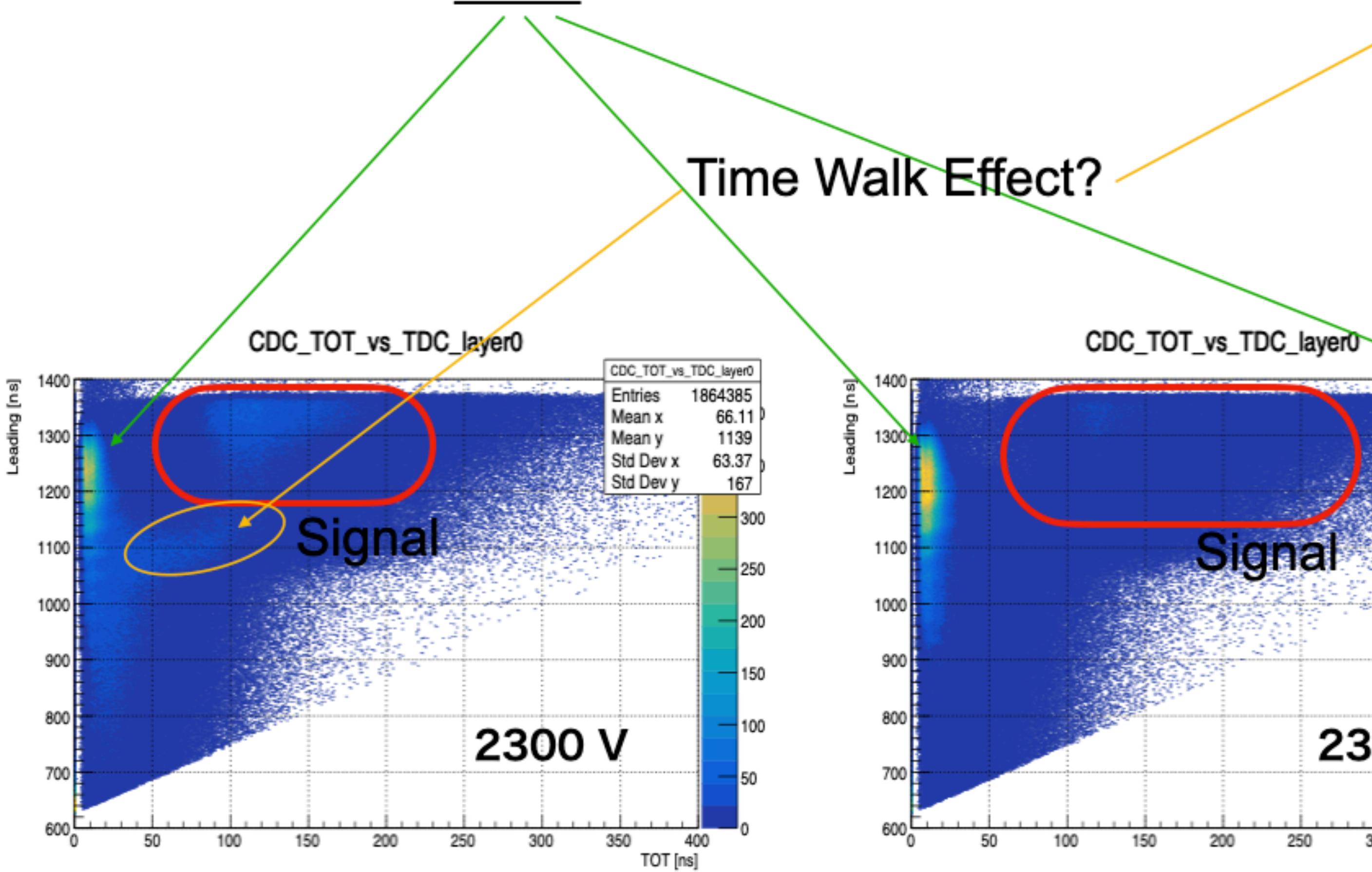
- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events

Few Mult, few “pedestal” (ArC₂H₆)



Raw TOT vs Leading of CDC (e.g. Layer 0)

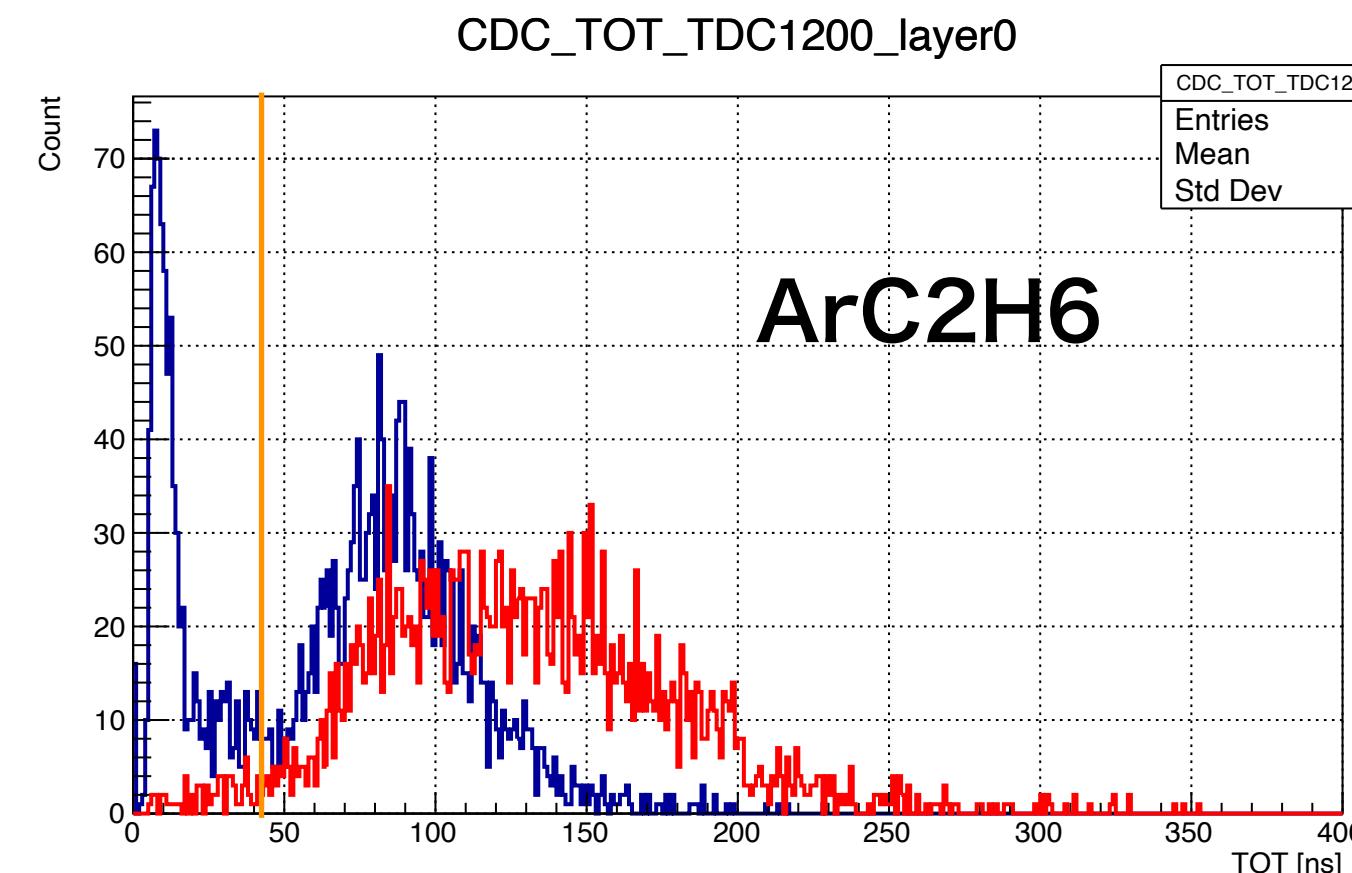
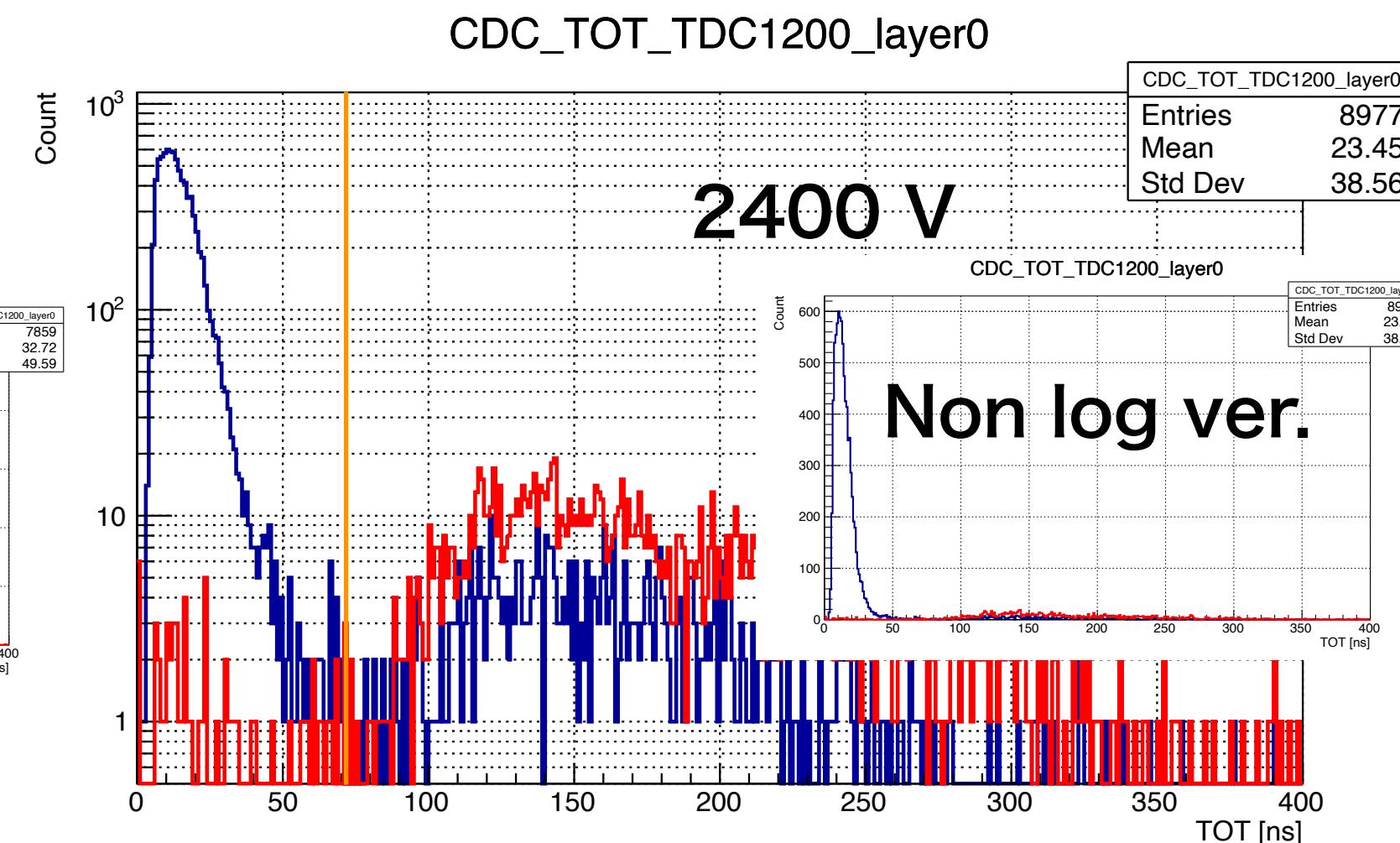
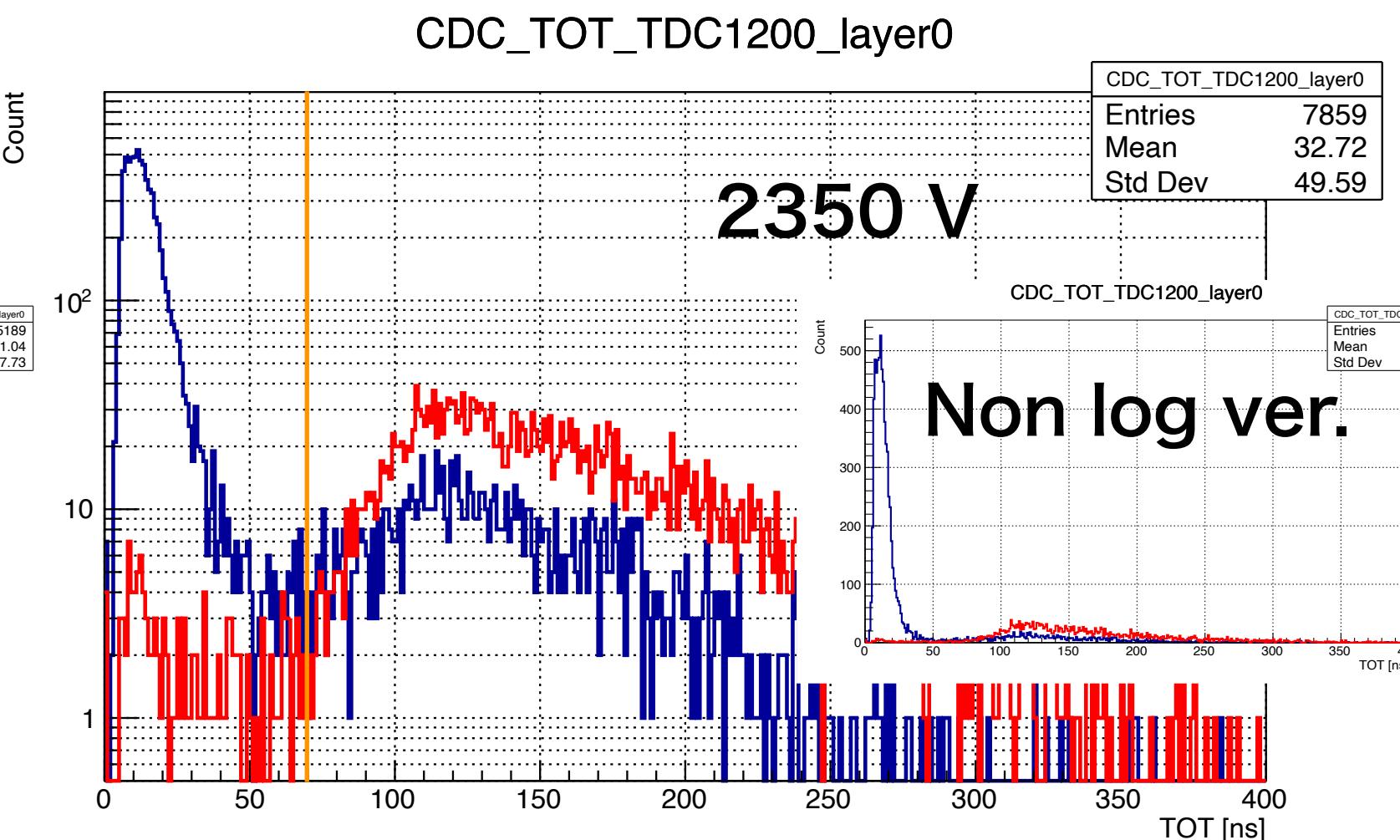
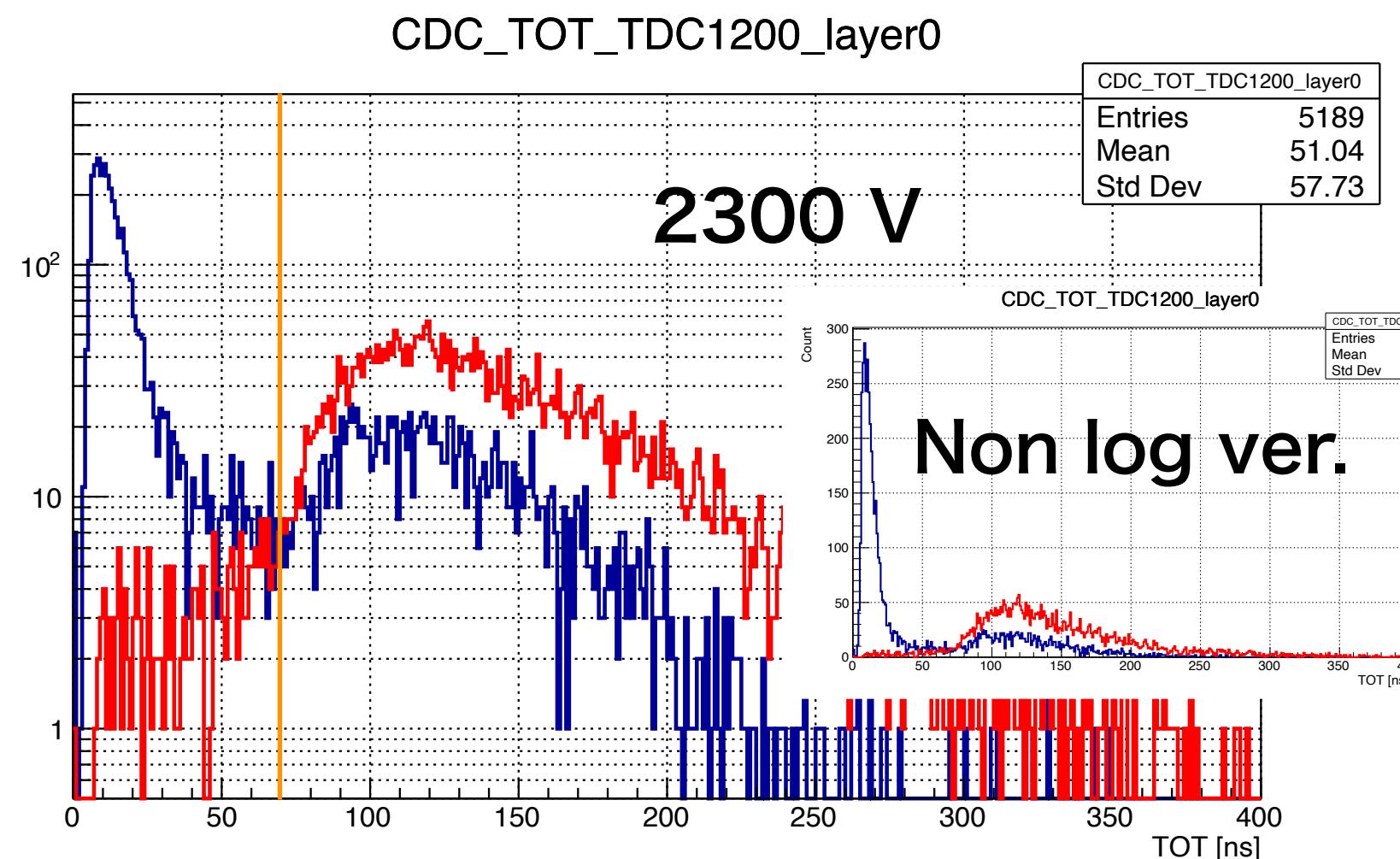
- Difficult to see the structure of the signal from 2375 V
- Able to separate signal from distribution of noise
- Want to remove these



TOT at some representative value of Leading(e.g. Layer 0)

- Blue; Leading = 1200 [ch], to focus “pedestal” peak
- Red; Leading = 1350 [ch], to focus “signal” peak

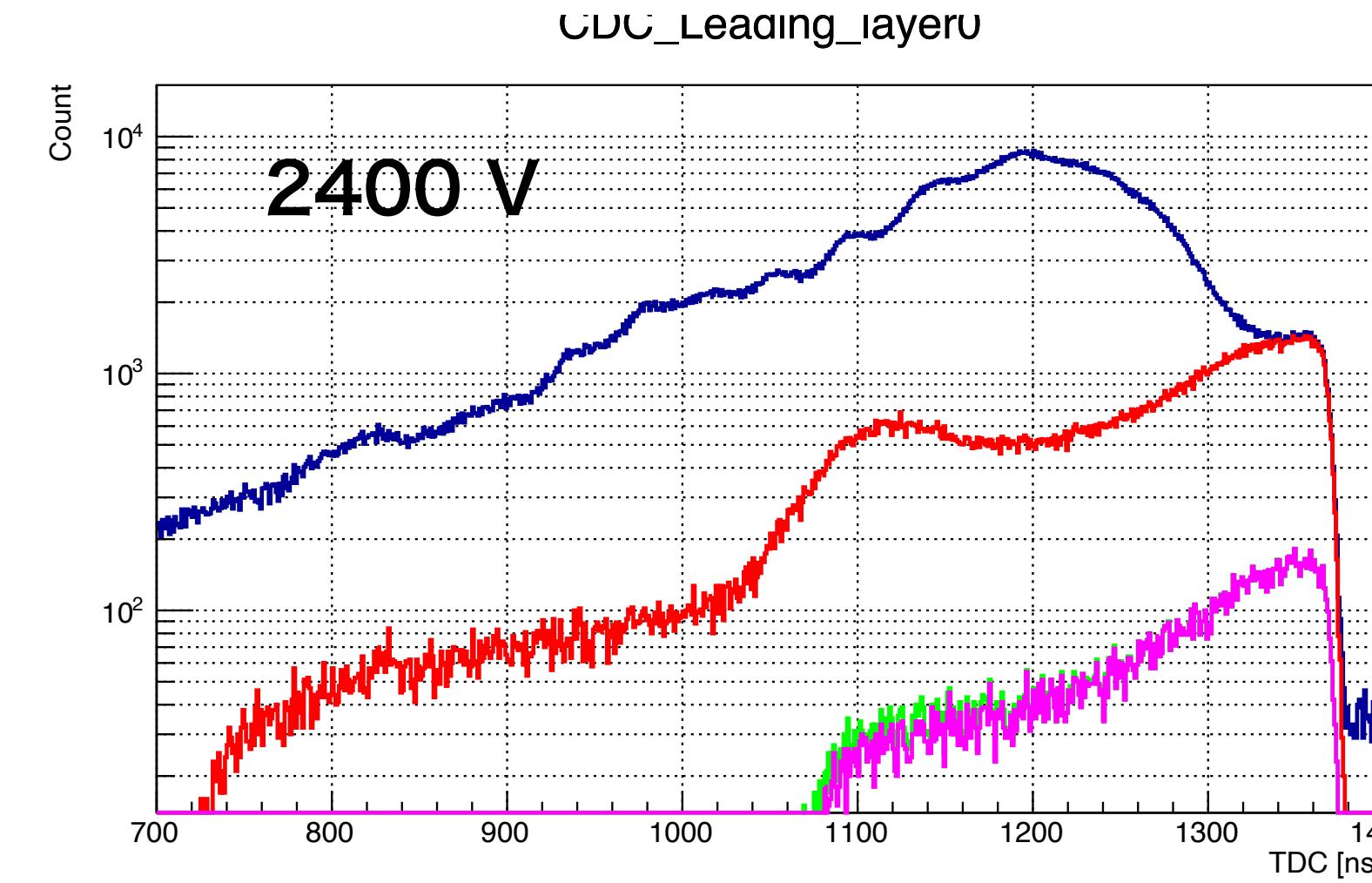
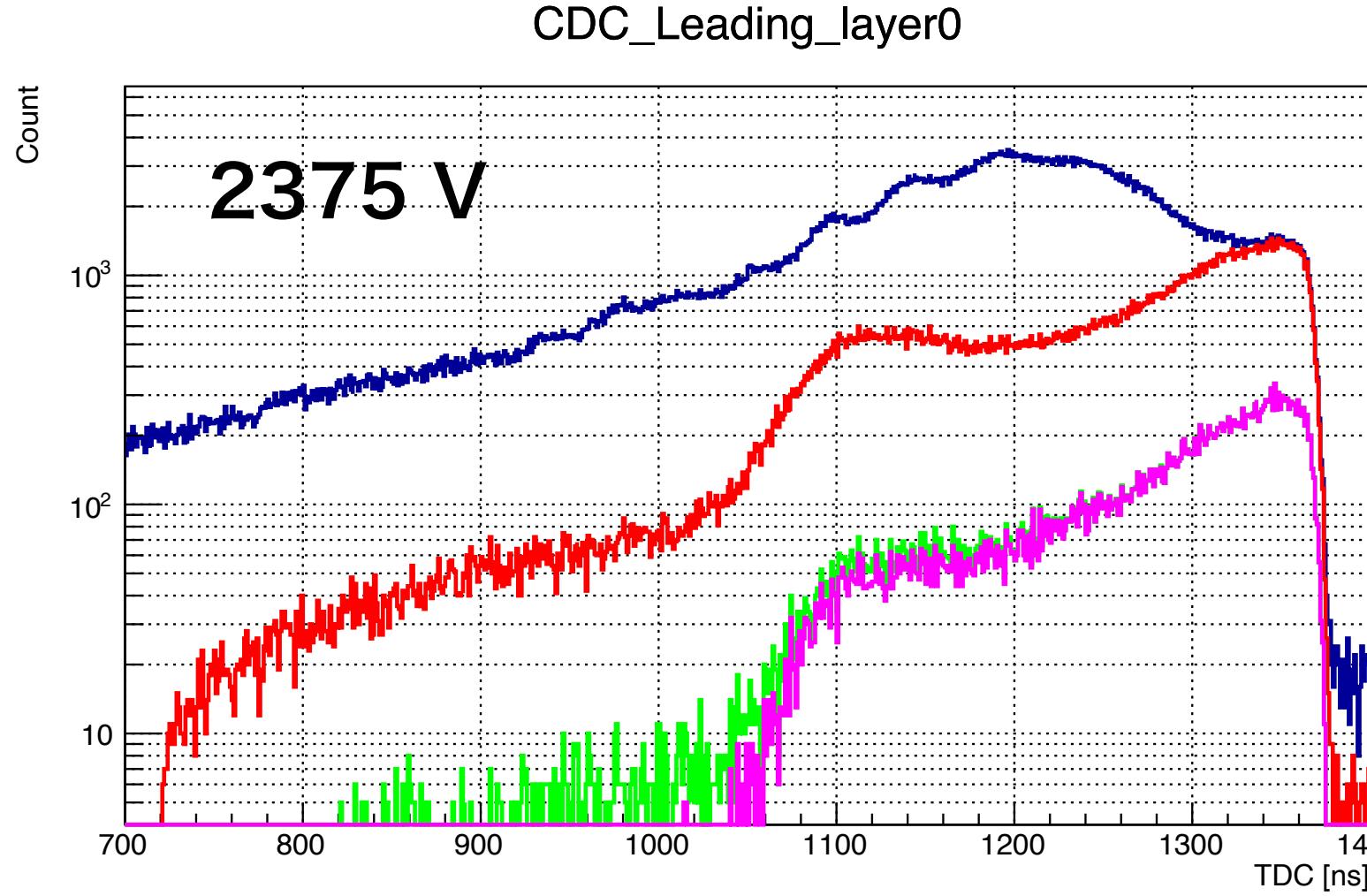
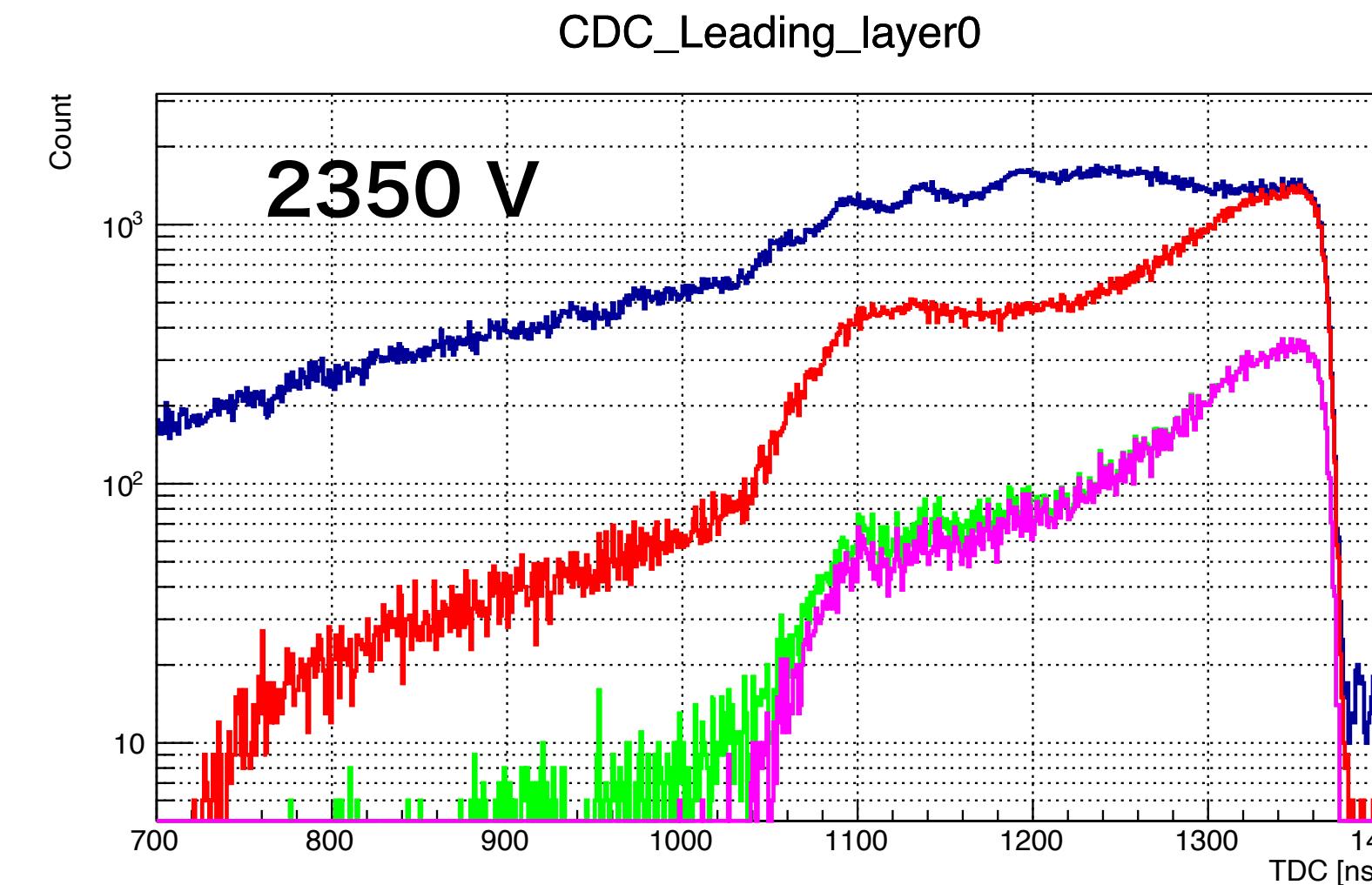
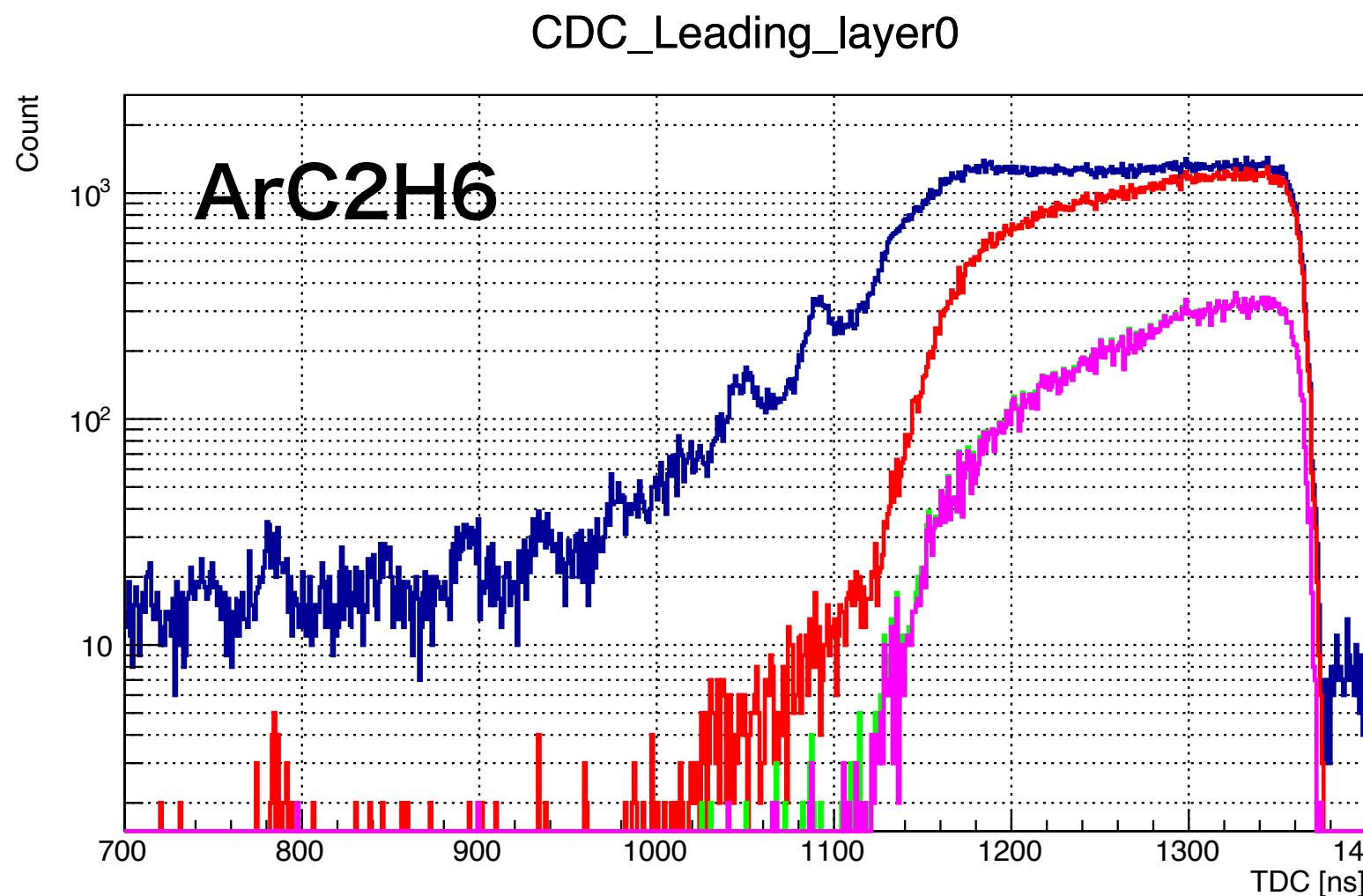
- TOT cut should be “TOT > 70” by just seeing.
- It’s difficult to make a quantitative evaluation due to the large amount of fluctuation.



- About ArC2H6, TOT cut should be “TOT > 40”.

Leading after cut (e.g. Layer 0)

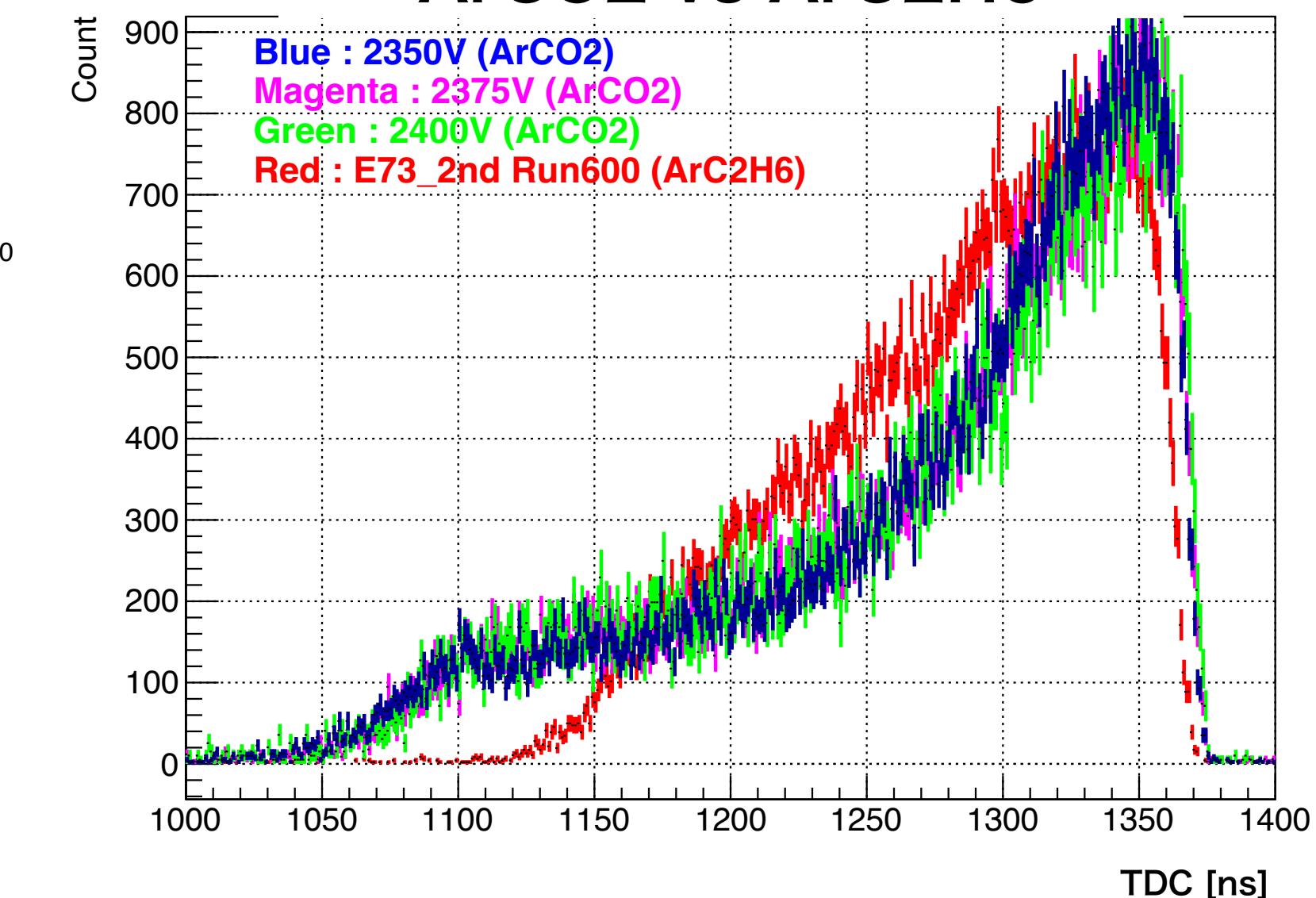
- Used 230,000 events, respectively
- Blue; Raw, Red; TOT cut, Green; Mul==2 && Red, Magenta; First Hit && Green



These shapes are totally different.

Leading(Magenta), Scaled

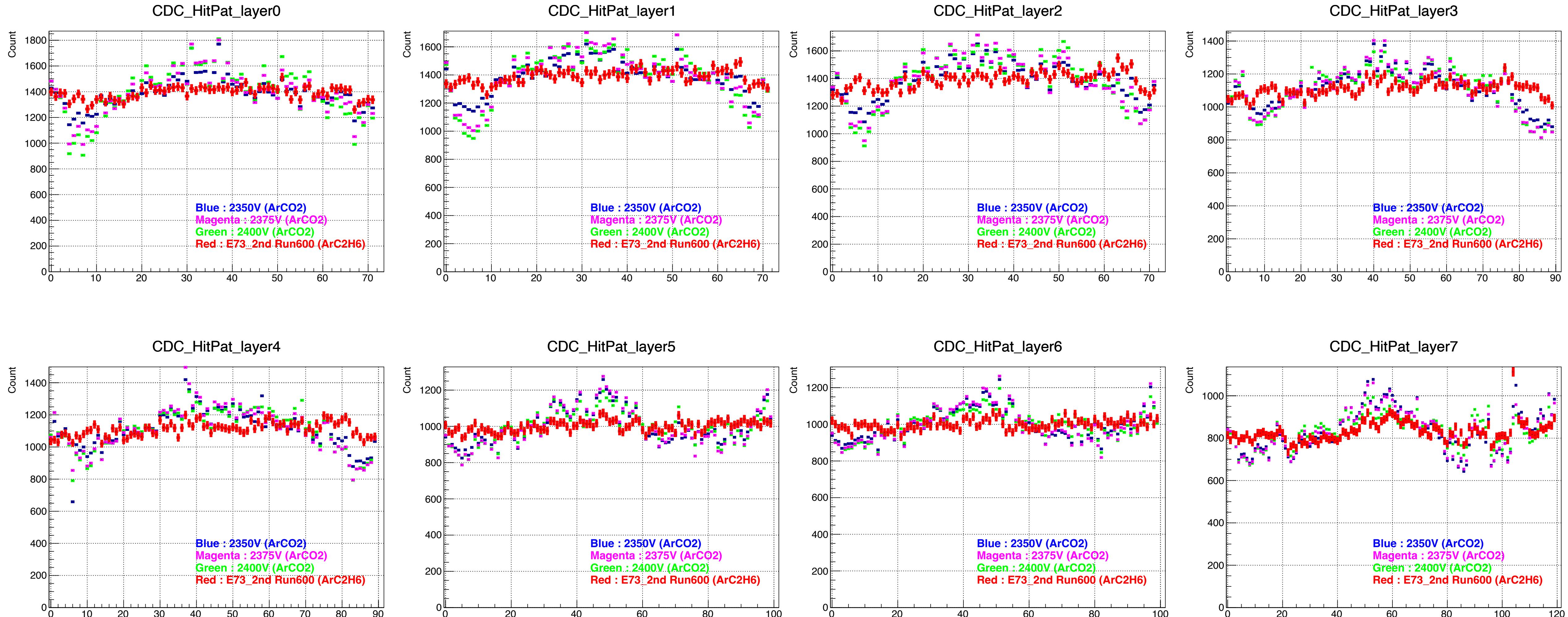
ArCO₂ vs ArC₂H₆



Back Up

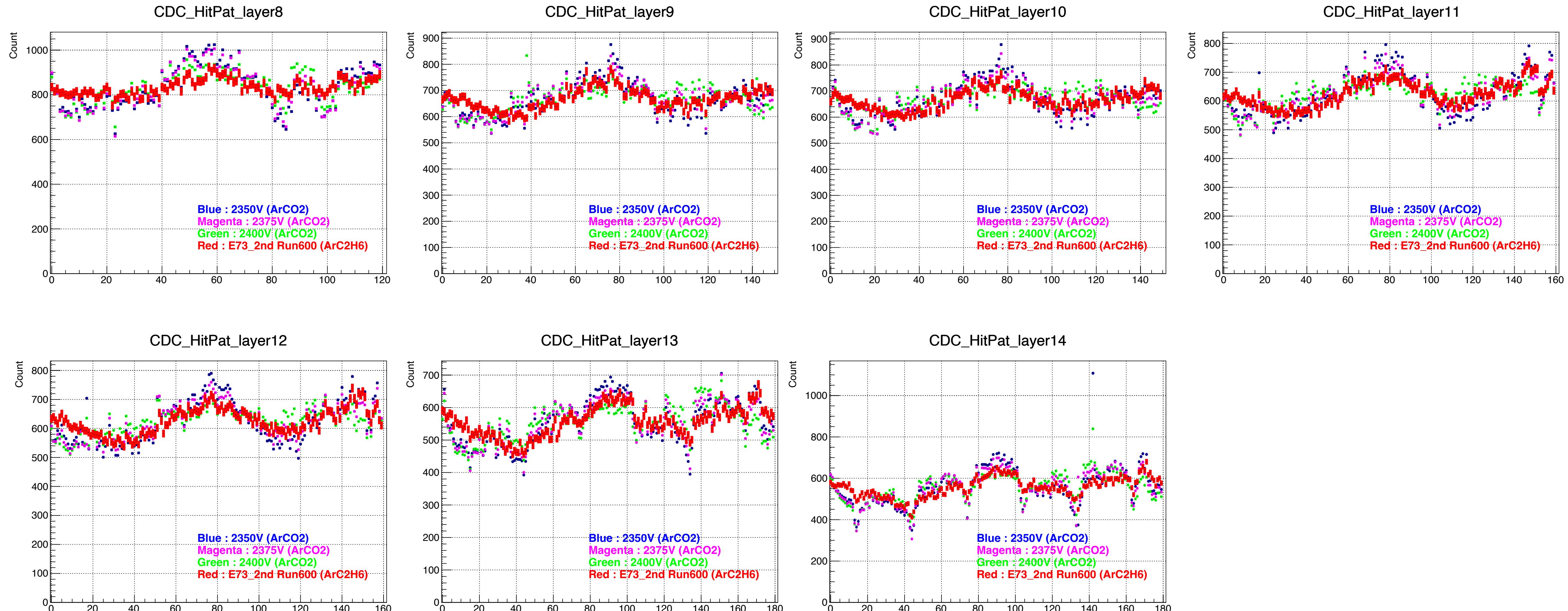
Hit Pattern of CDC (Layer 0 ~ 7)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events



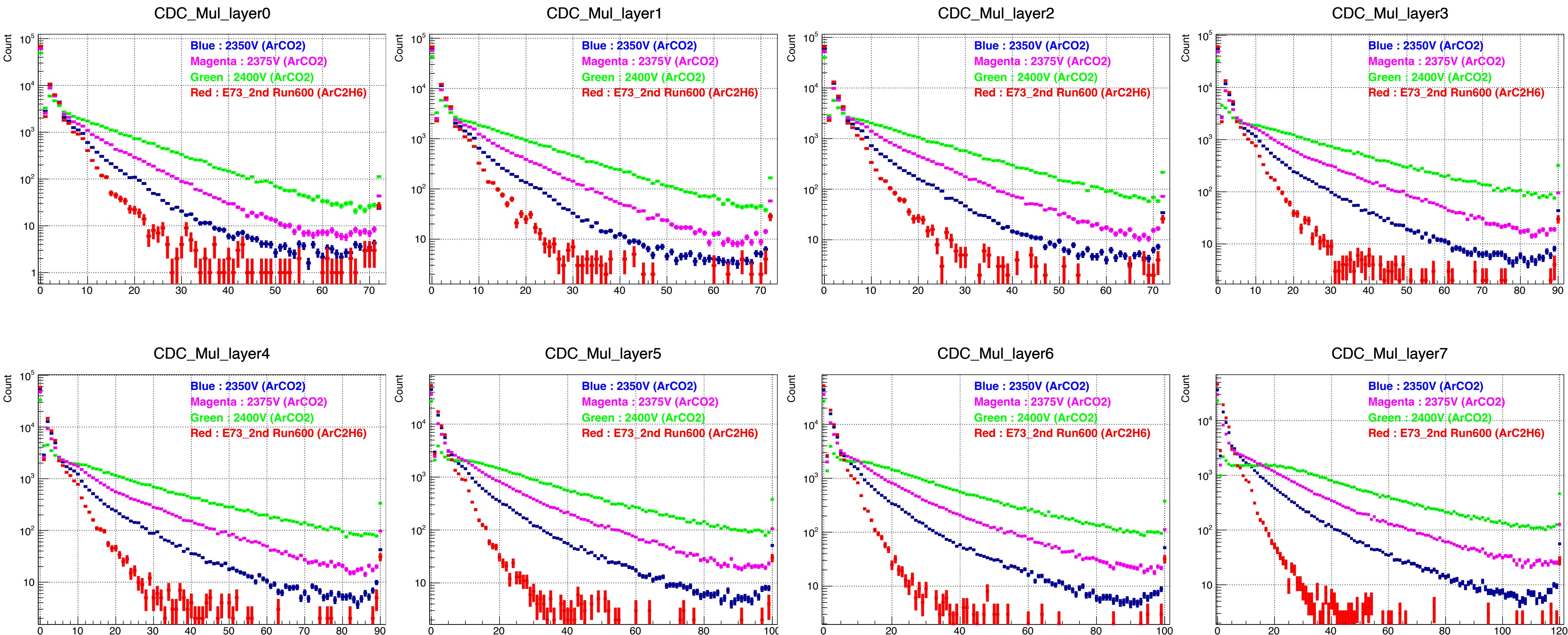
Hit Pattern of CDC (Layer 8 ~ 14)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events



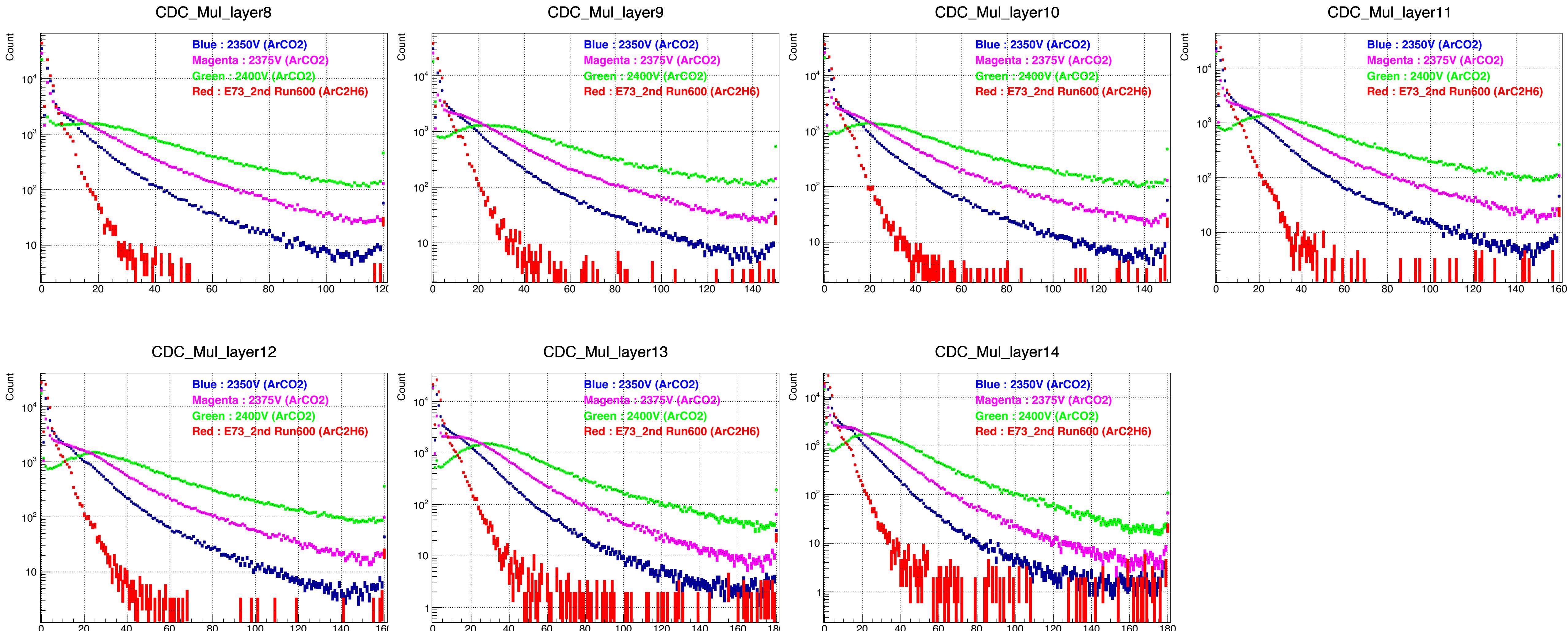
Raw Multiplicity of CDC (Layer 0 ~ 7)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events



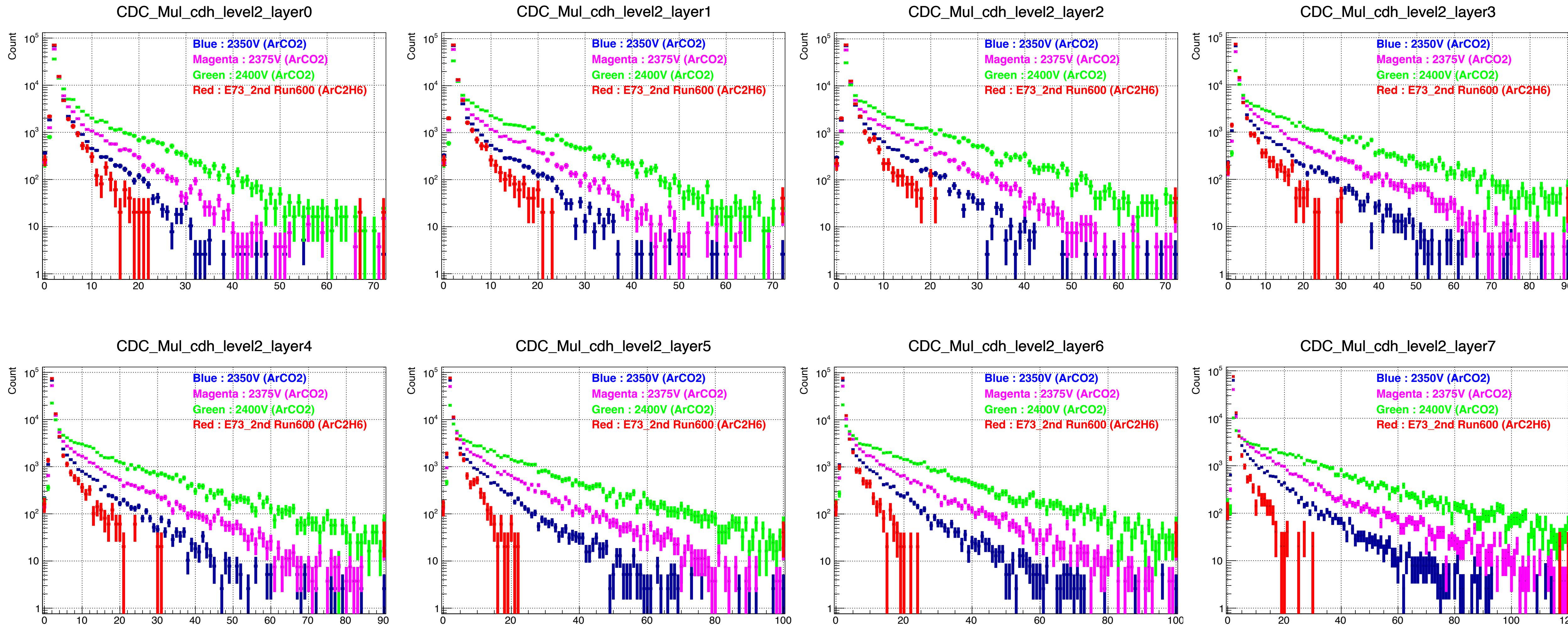
Raw Multiplicity of CDC (Layer 8 ~ 14)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events



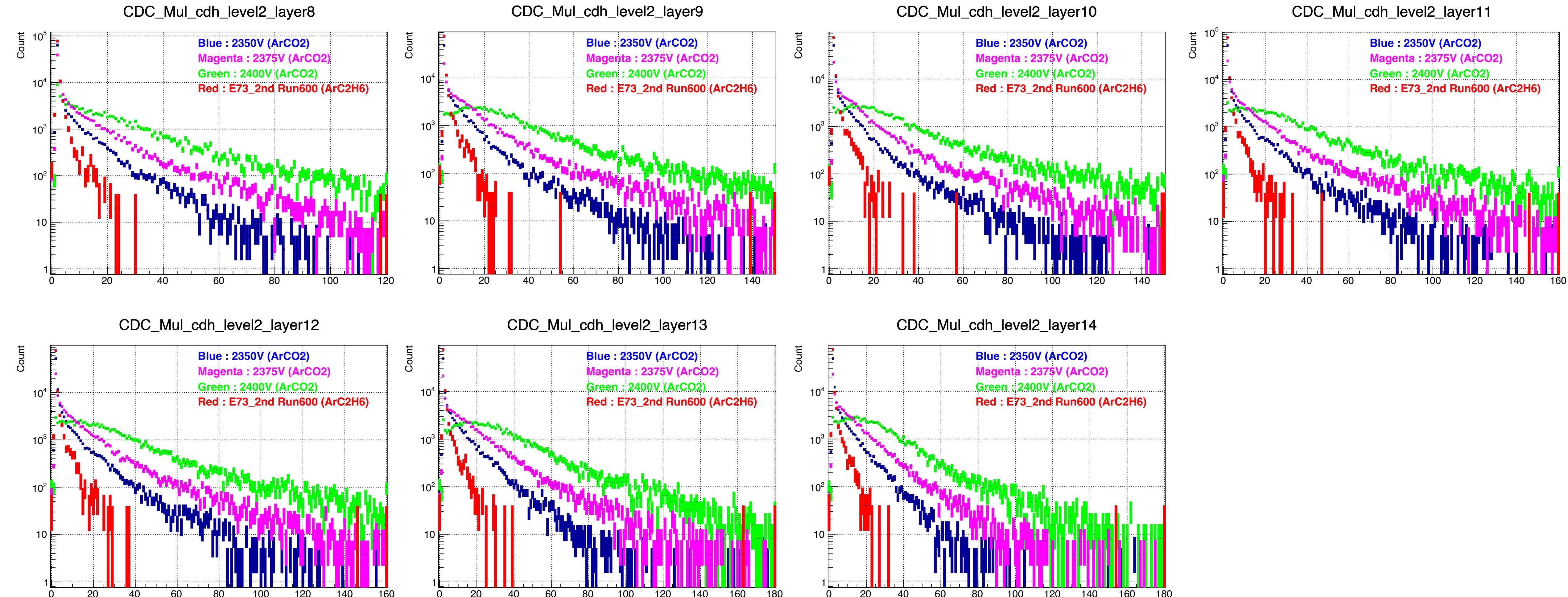
Multiplicity of CDC after event selection (Layer0~7)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events



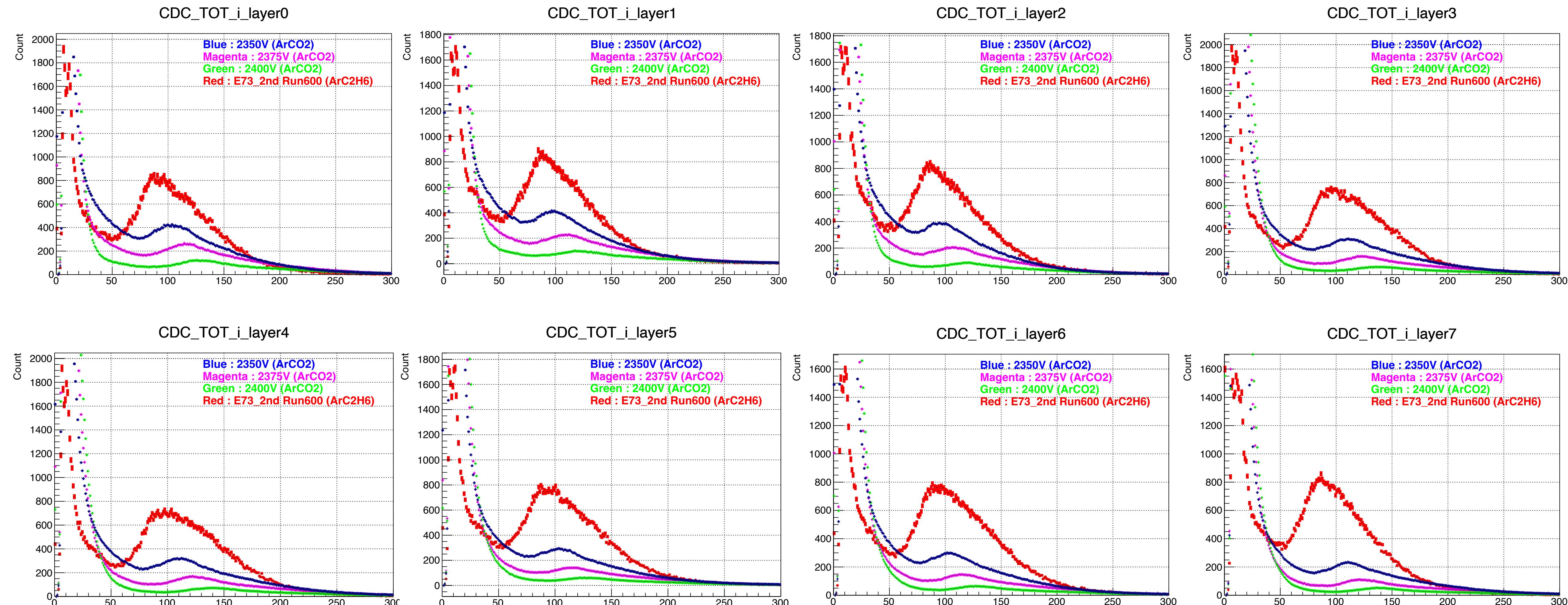
Multiplicity of CDC after event selection (Layer8~14)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events



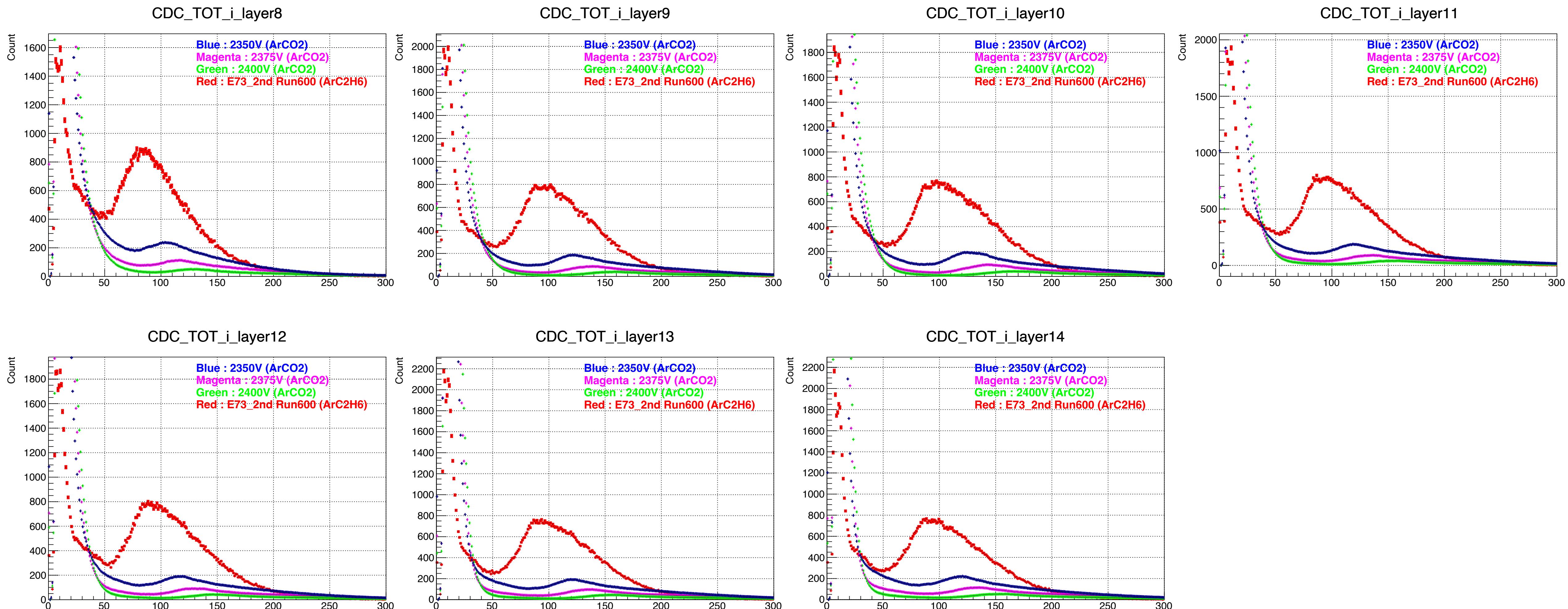
Raw TOT of CDC (Layer0~7)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events

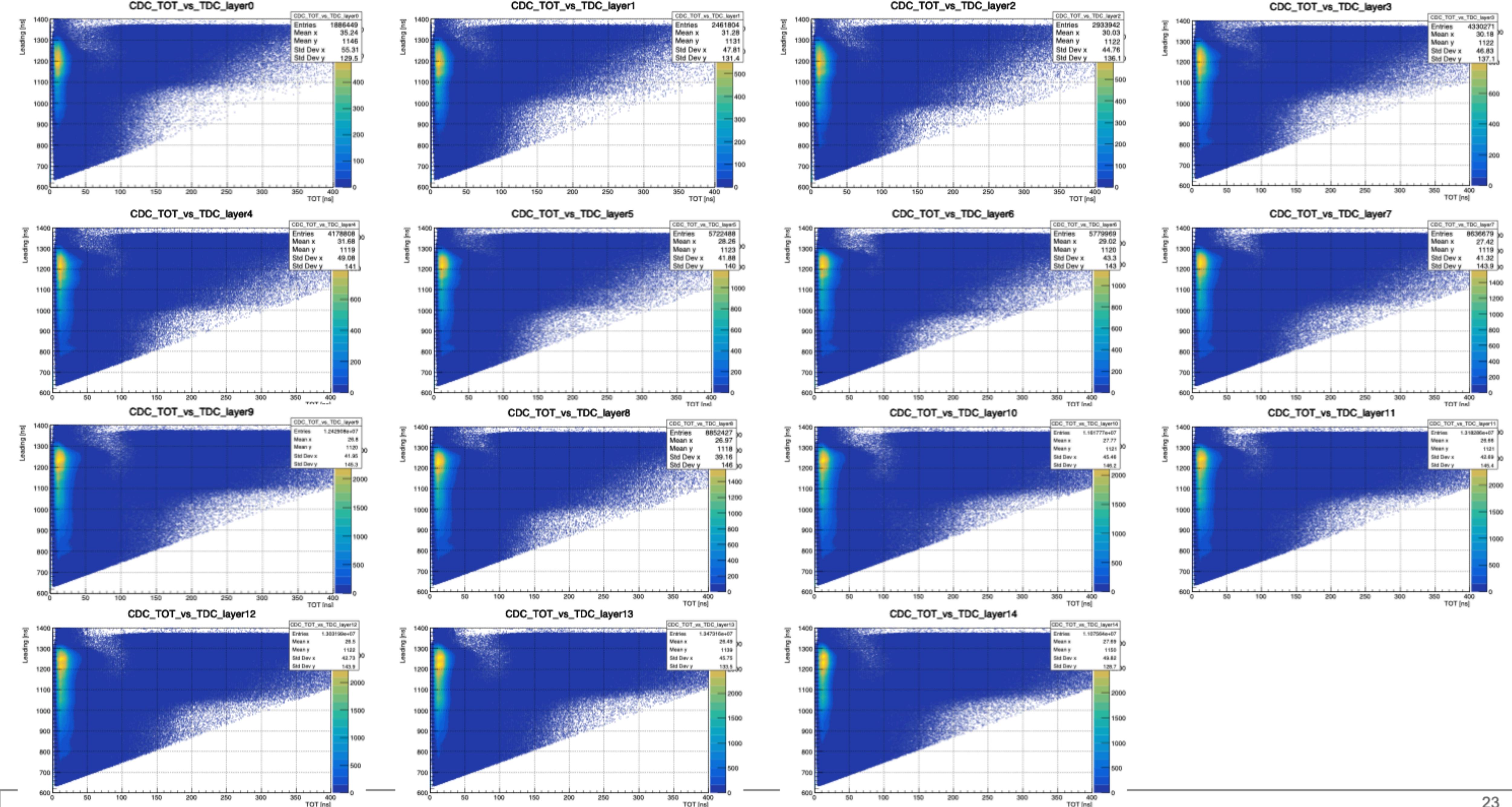


Raw TOT of CDC (Layer8~14)

- Compare between ArCO₂ and ArC₂H₆
- Scaled by 100,000 events



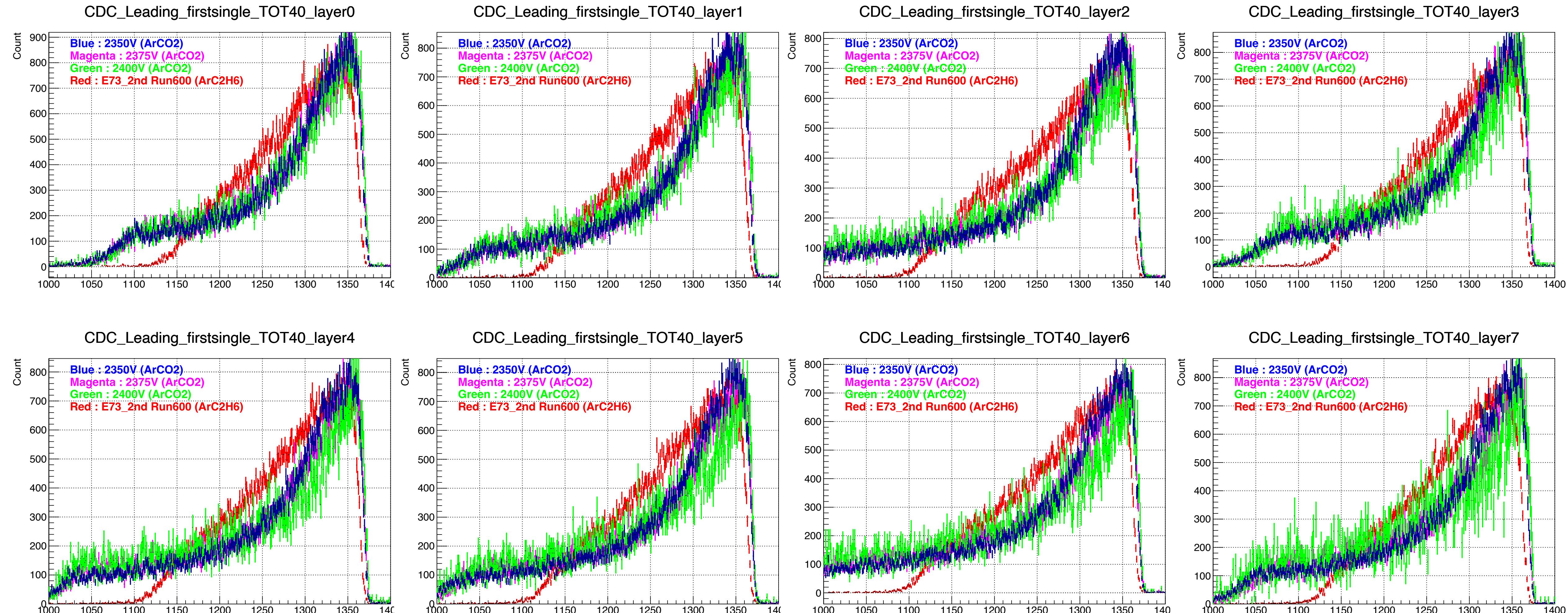
Raw TOT vs Leading of CDC (ArCO₂ 2400 V)



Leading after cut (Layer 0~7)

- First Hit && Mul==2 && TOT cut events
- Scaled by 100,000 events

These shapes are totally different.



Leading after cut (Layer 8~14)

- First Hit && Mul==2 && TOT cut events
- Scaled by 100,000 events

These shapes are totally different.

