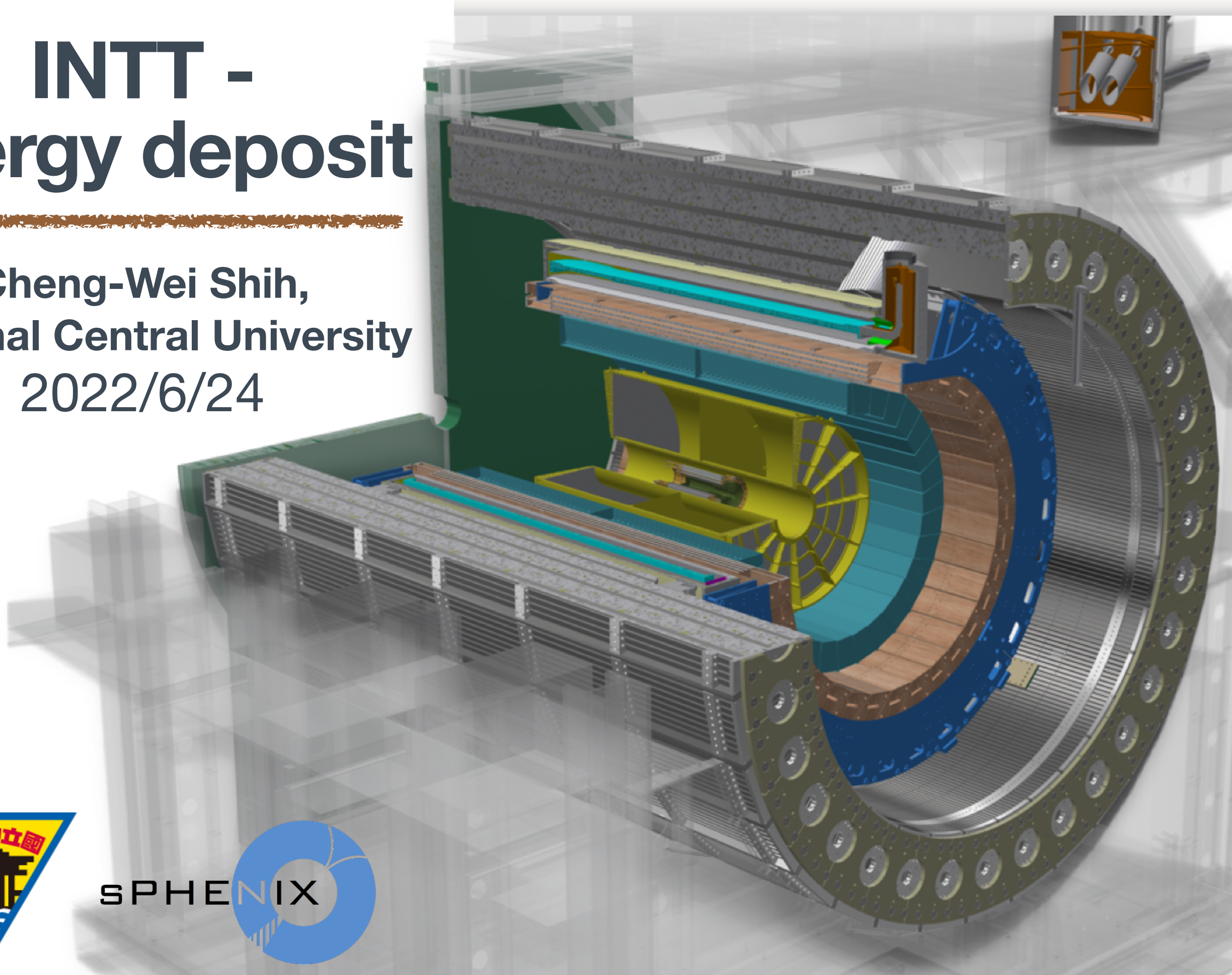


# INTT - energy deposit

Cheng-Wei Shih,  
National Central University  
2022/6/24



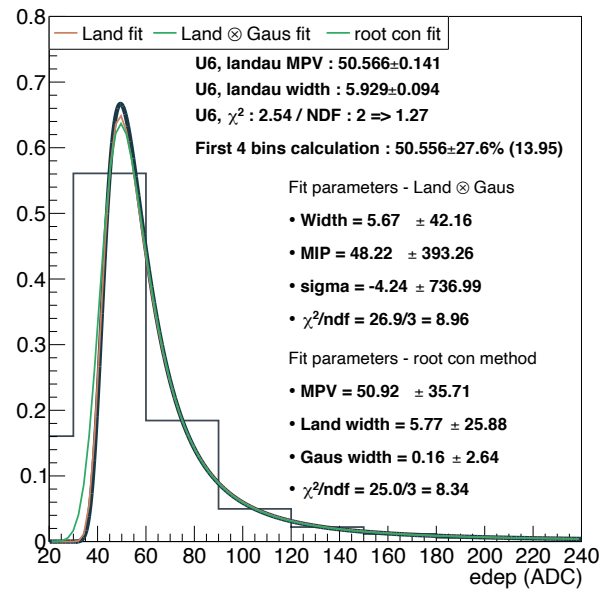
# // Source test, different supply voltage

Incorrect, the entry of bin is not normalized

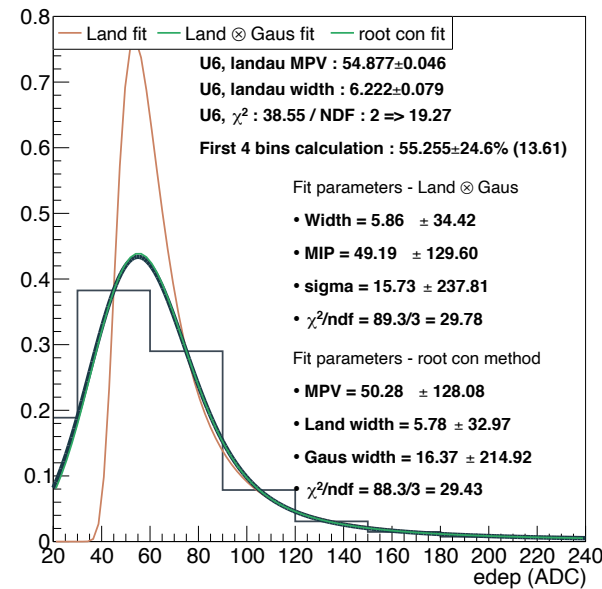
A further approach, the source test with different supply voltage. From 25 V to 100 V

Sr-90, self-trigger, threshold 20 ADC, adc setting : 20, 30, 60, 90, 120, 150, 180, 210

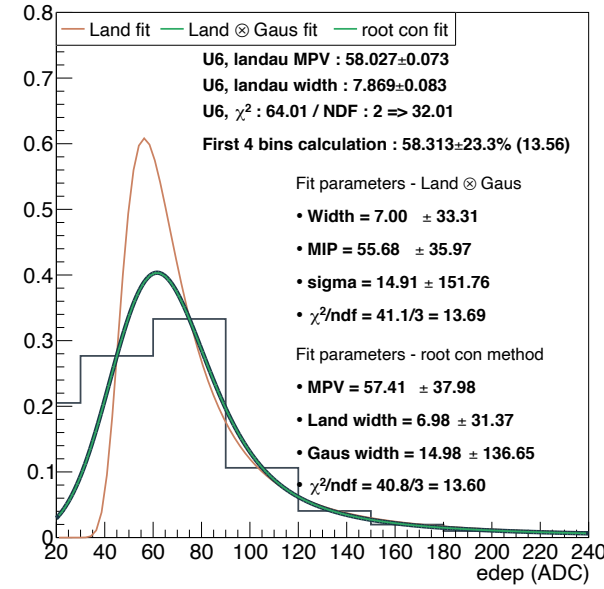
chip id : 6, voltage : 25



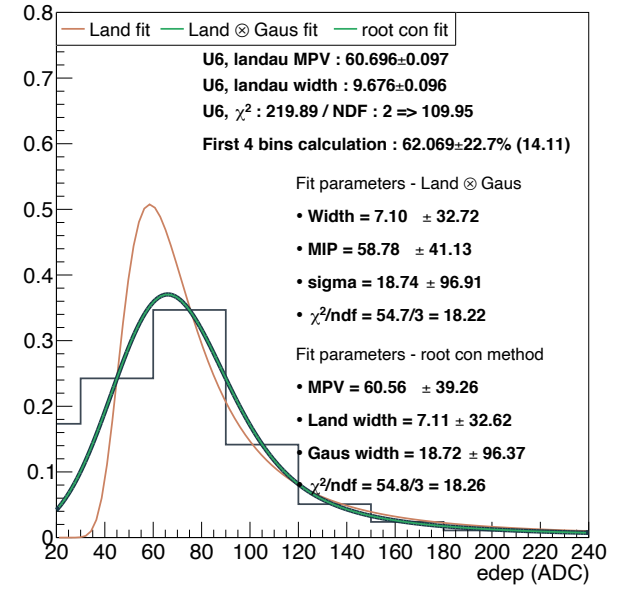
chip id : 6, voltage : 35



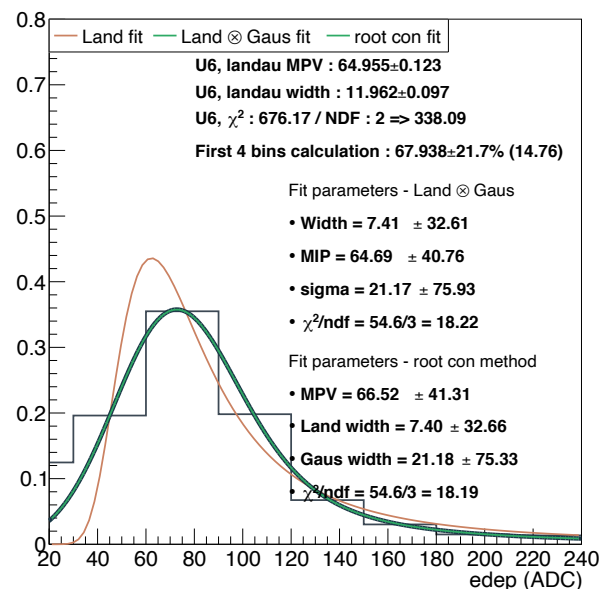
chip id : 6, voltage : 43



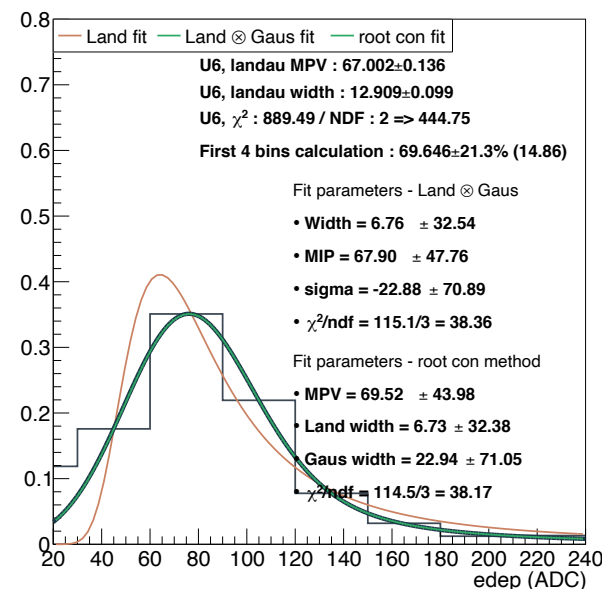
chip id : 6, voltage : 50



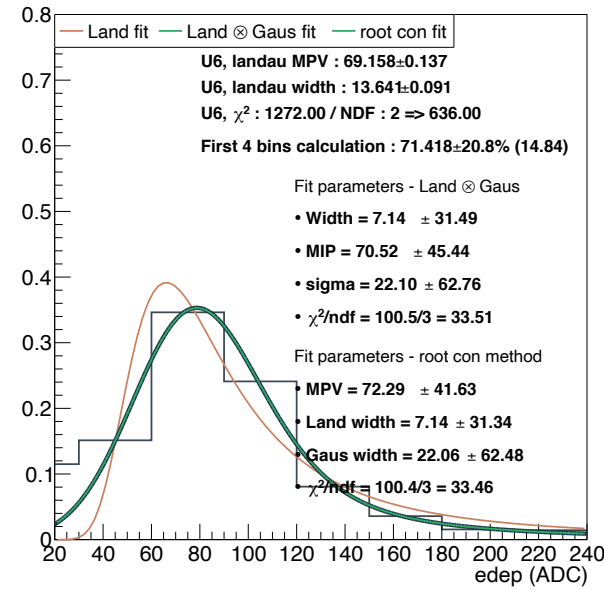
chip id : 6, voltage : 60



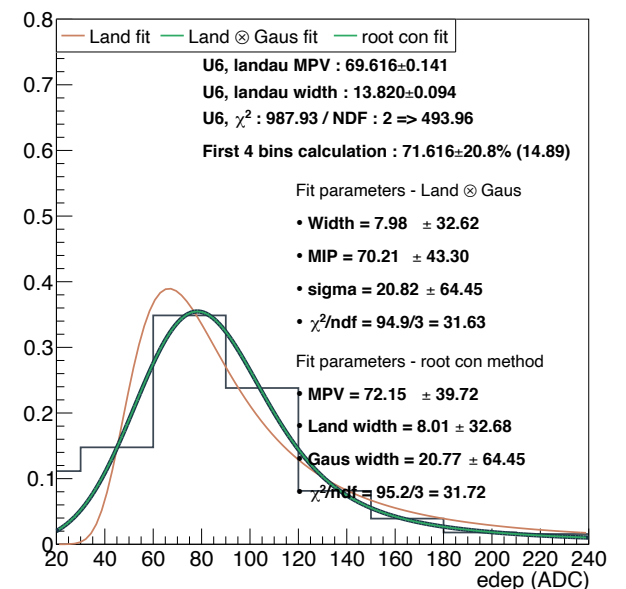
chip id : 6, voltage : 70



chip id : 6, voltage : 85



chip id : 6, voltage : 100

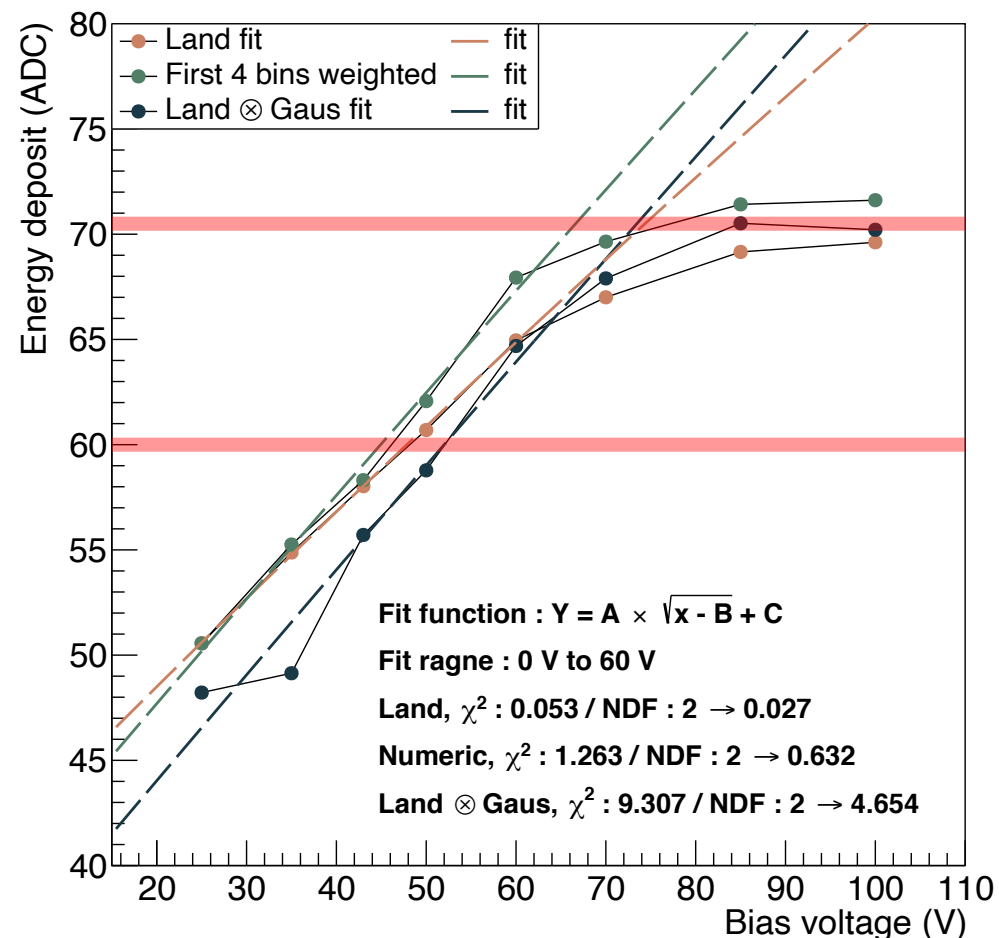


I used the root official convolution fit as well. but the return of the MPV is not true MPV

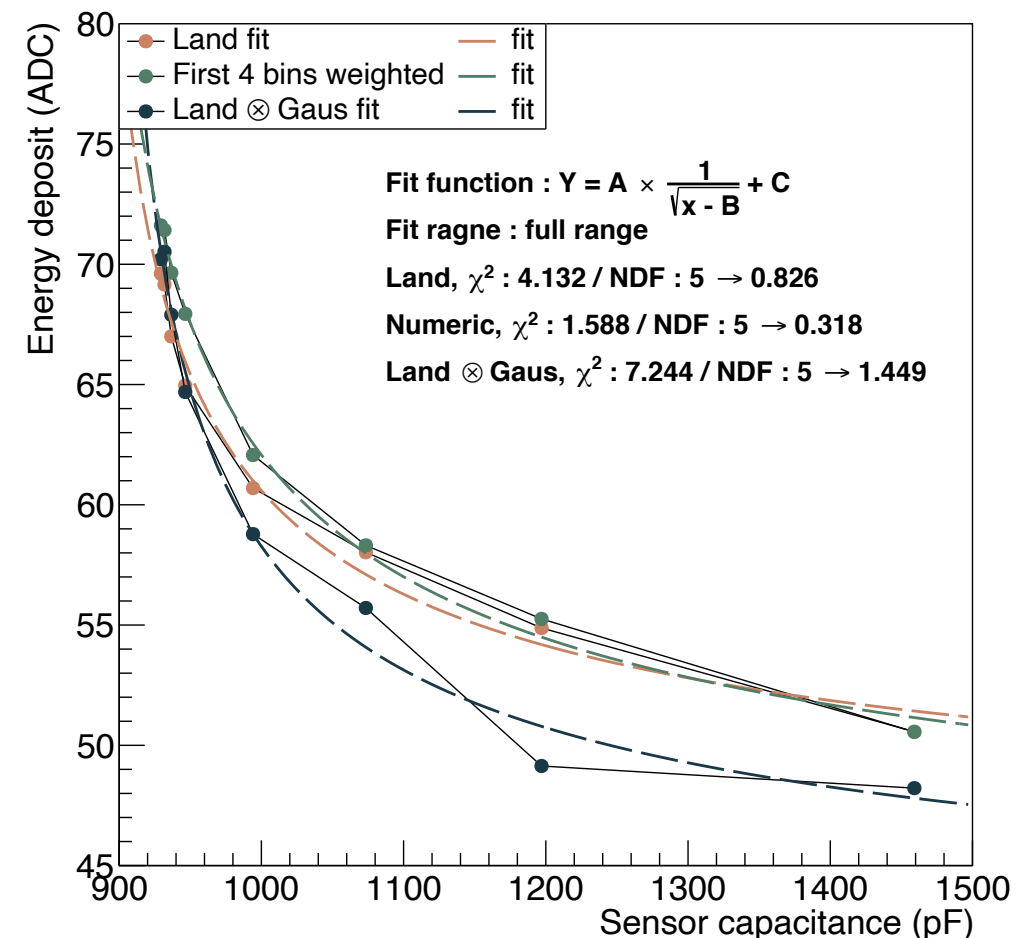
# // Source test, different supply voltage

Because the resolution of the energy is poor, 3 approaches to obtain the peak position : pure land, land  $\otimes$  gauss and a numeric weighted method calculation with first 4 bins

Energy deposit v.s. Bias voltage



Energy deposit v.s. Sensor capacitance



The result fits to our expectation, the discrepancy increases as the bias voltage increases. Because it gradually reaches to the limit of the depletion region

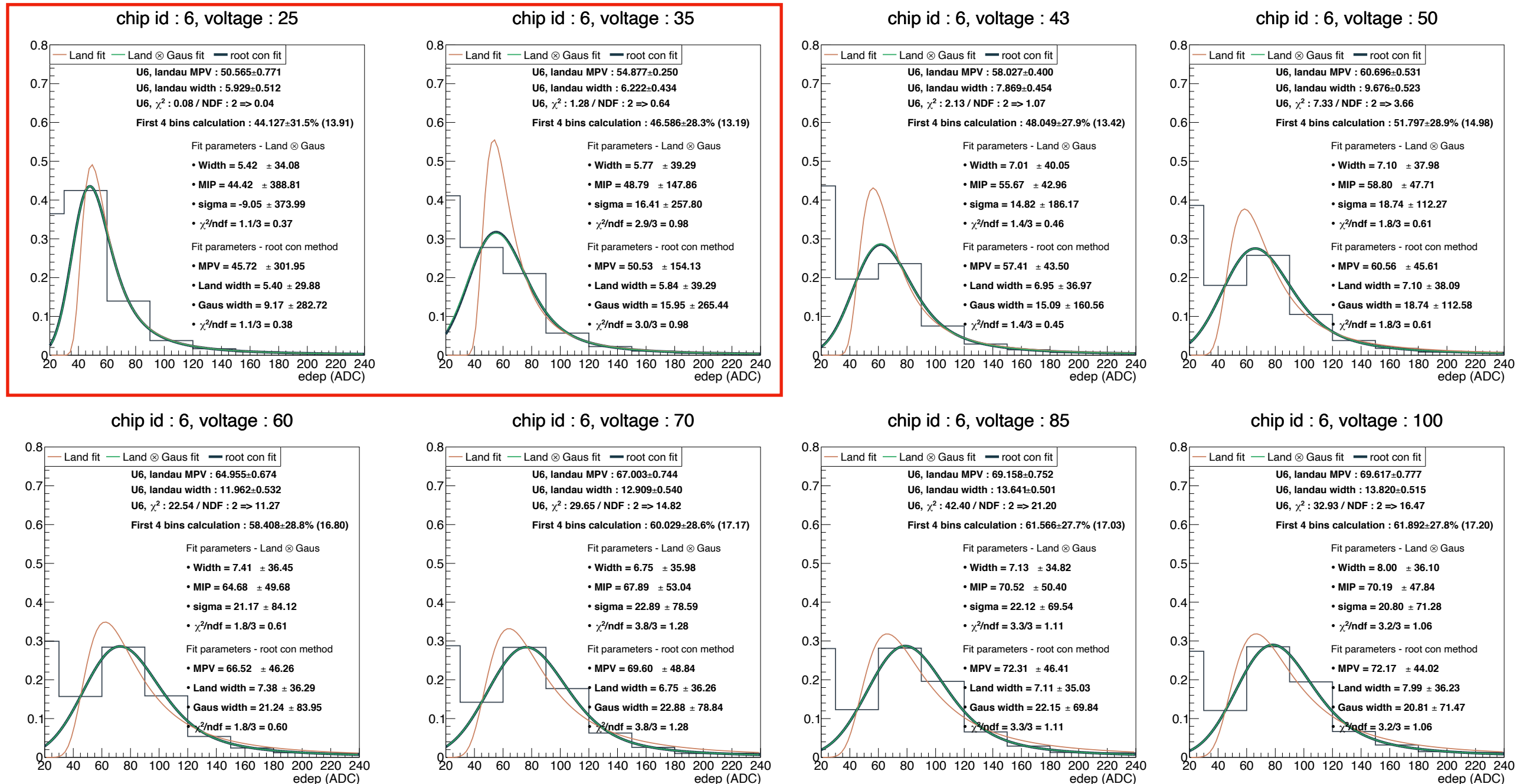
For the case of capacitance, it is reasonable. The full range is considered for the fitting.

# // Source test, different supply voltage

Sr-90, self-trigger, threshold 20 ADC, adc setting : 20, 30, 60, 90, 120, 150, 180, 210

The entry of each bin is divided by the bin width

The signal overlaps with the noise too much.

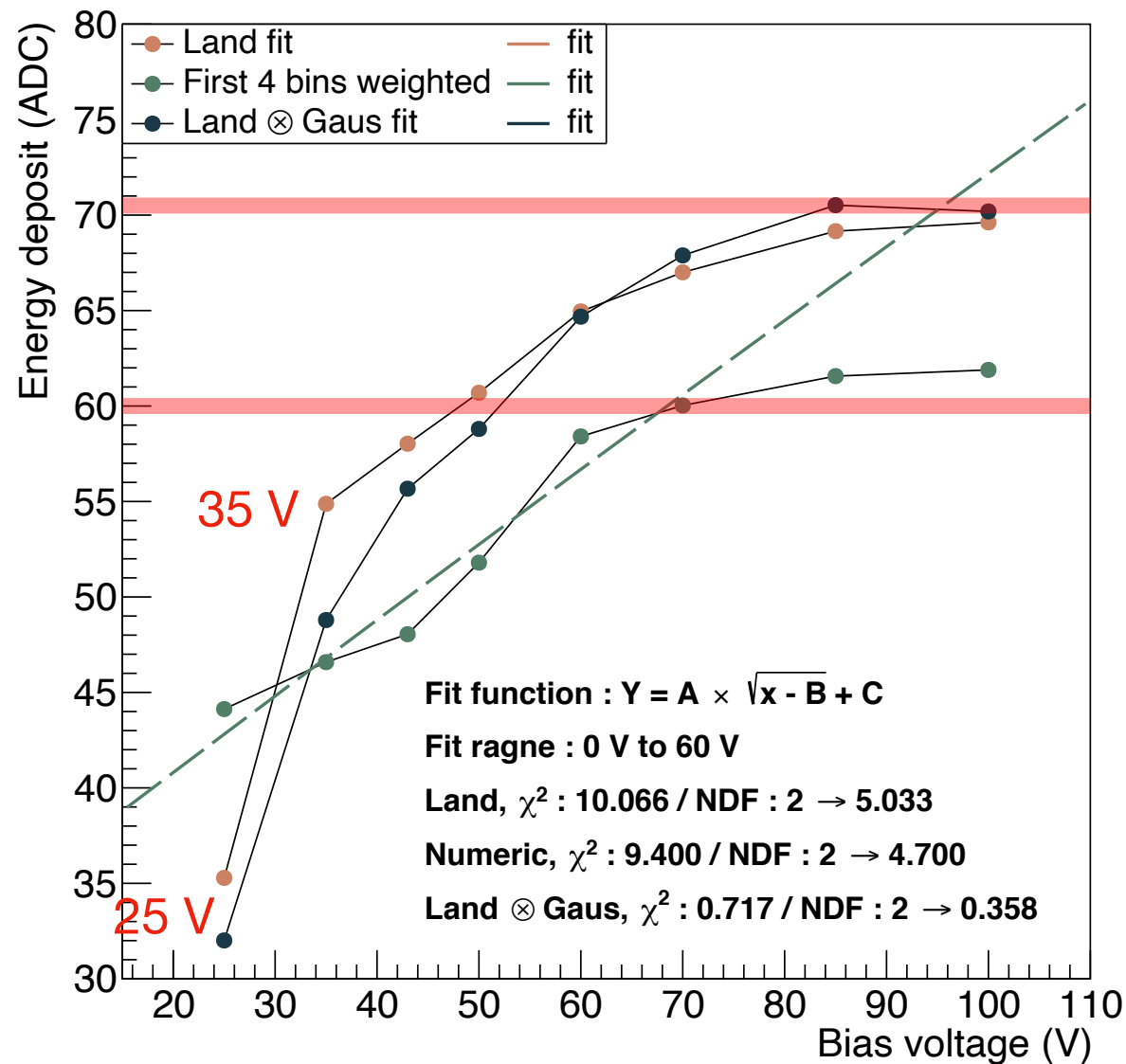


# // Source test, different supply voltage

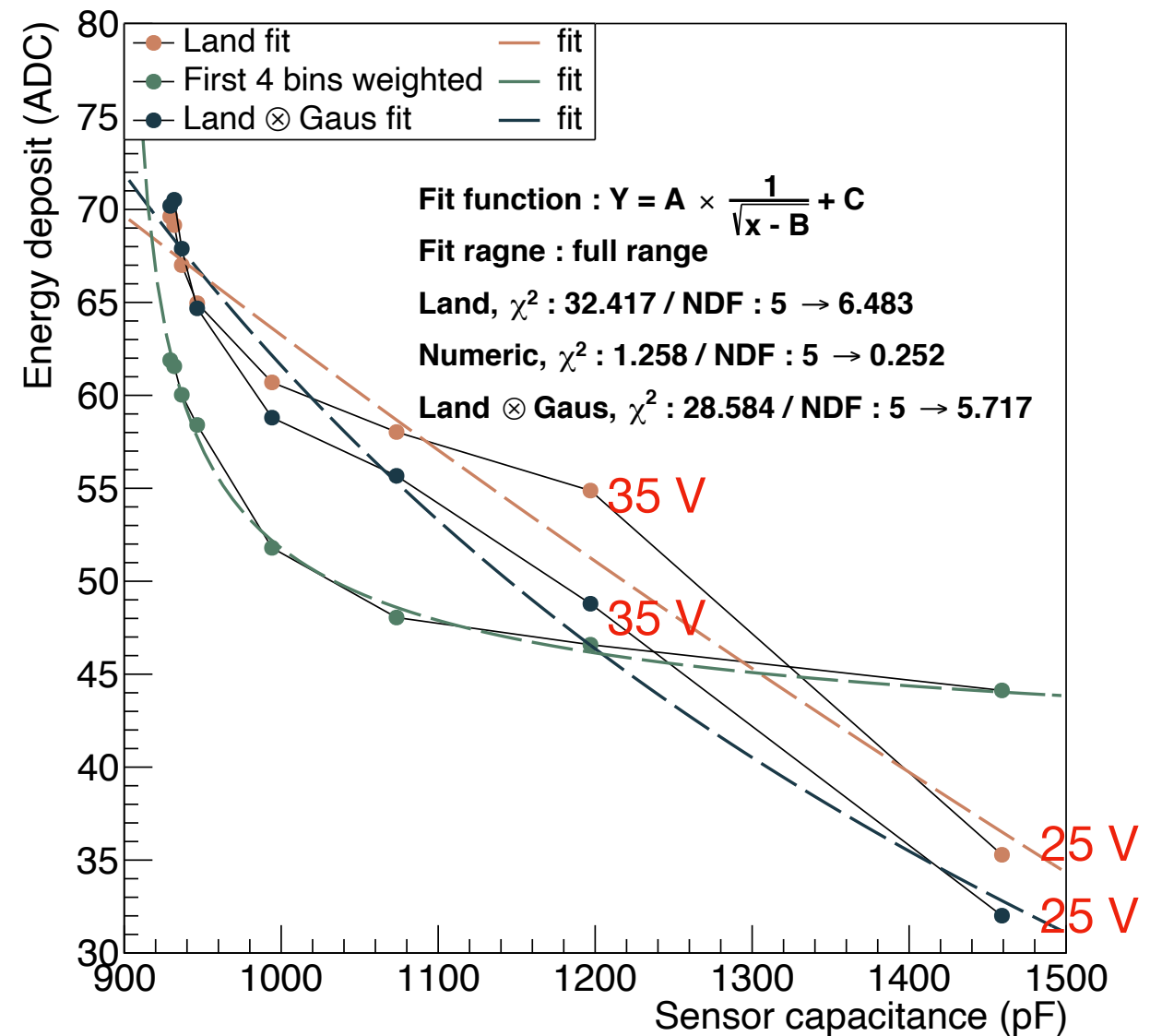
Sr-90, self-trigger, threshold 20 ADC, adc setting : 20, 30, 60, 90, 120, 150, 180, 210

The entry of each bin is divided by the bin width

Energy deposit v.s. Bias voltage



Energy deposit v.s. Sensor capacitance



The MPVs of run 25 V and run 35 V are not accurate due to large overlap of signal and noise

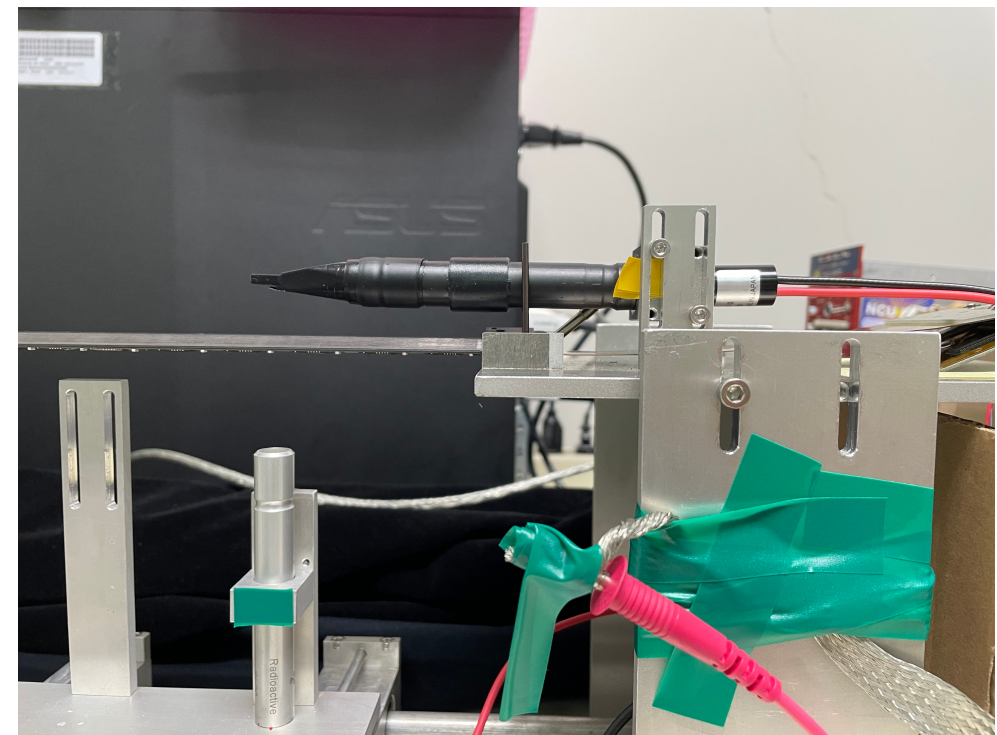
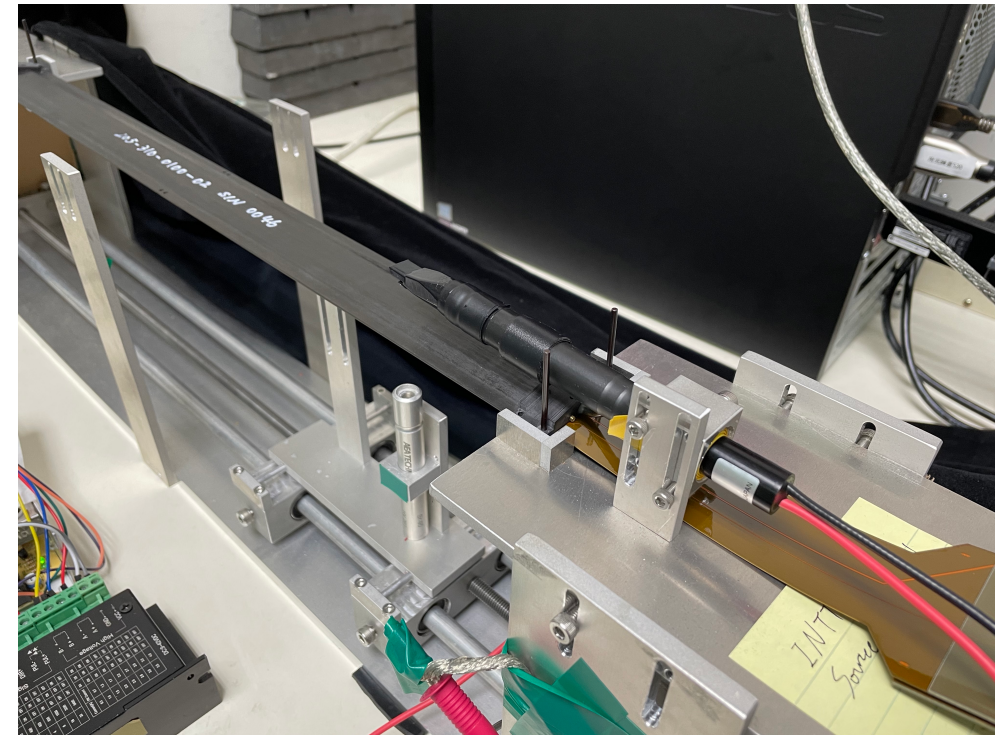
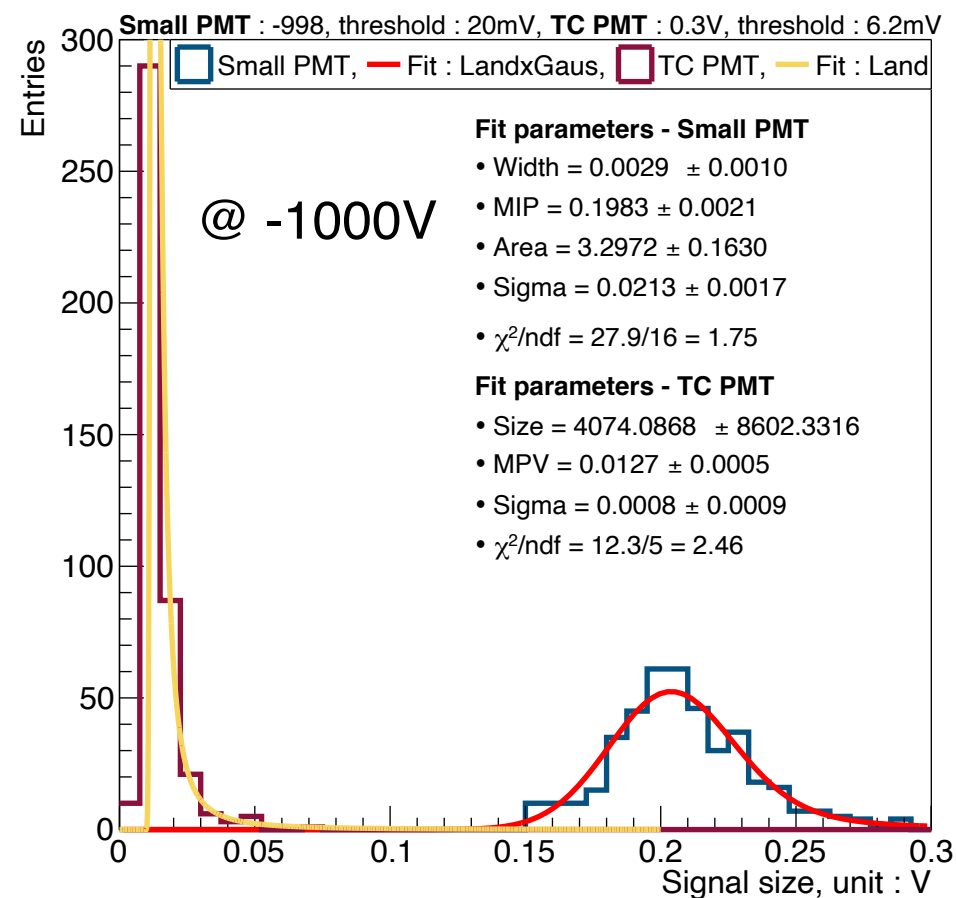
# // Source test, different supply voltage

The experiment was re-performed

**Upgrade** : add the scintillator, more data points & customized adc setting for different run

Trigger scintillator edep distribution

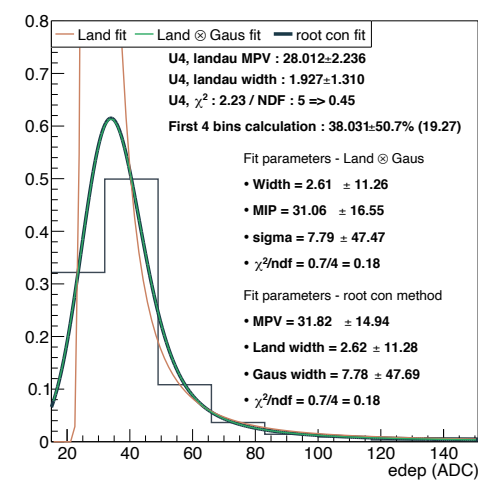
Signal size



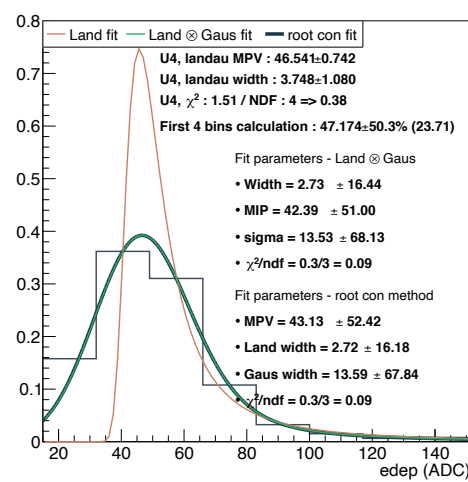
# // Source test, different supply voltage

Upgrade : add the scintillator, more data points & customized adc setting for different run

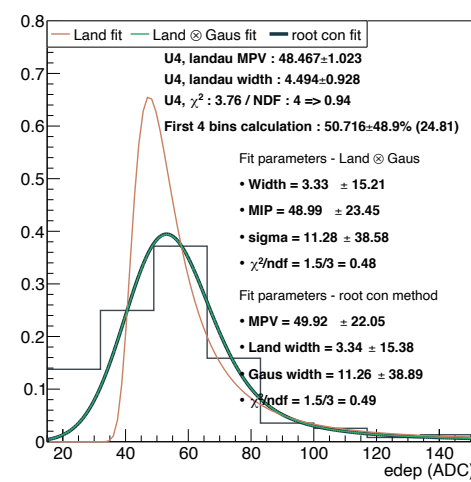
With Sci., chip id : 4, voltage : 15



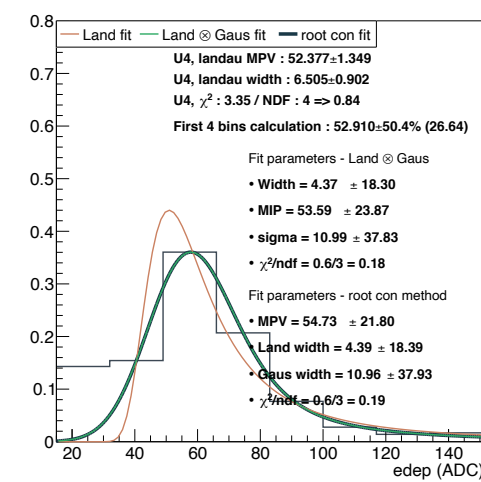
With Sci., chip id : 4, voltage : 25



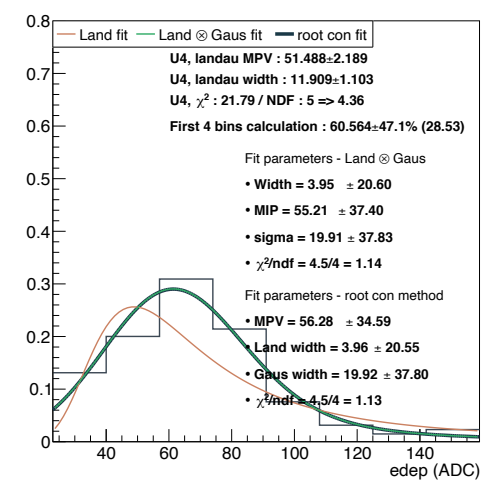
With Sci., chip id : 4, voltage : 30



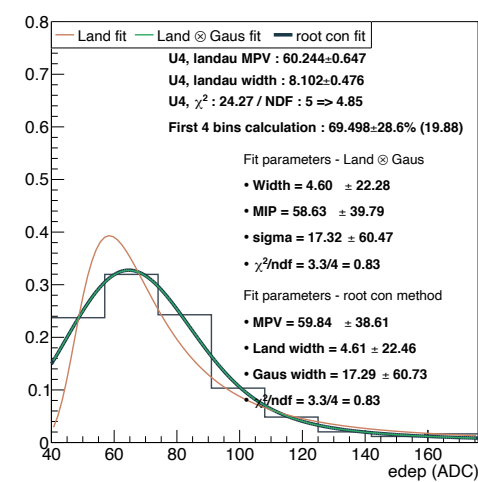
With Sci., chip id : 4, voltage : 35



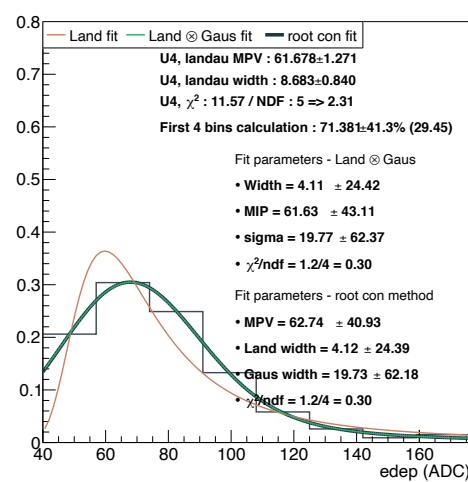
With Sci., chip id : 4, voltage : 43



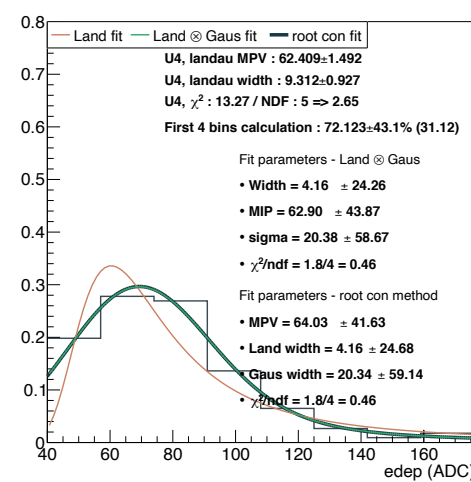
With Sci., chip id : 4, voltage : 50



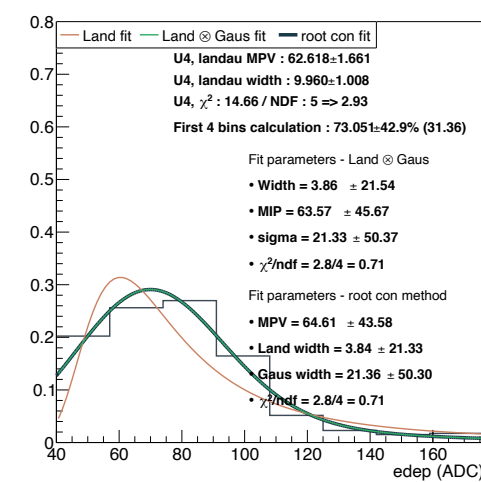
With Sci., chip id : 4, voltage : 55



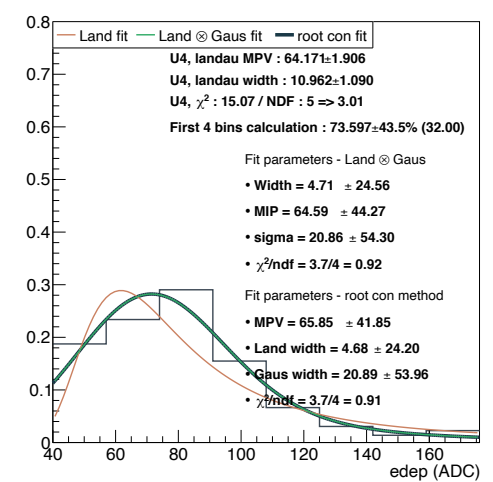
With Sci., chip id : 4, voltage : 65



With Sci., chip id : 4, voltage : 85



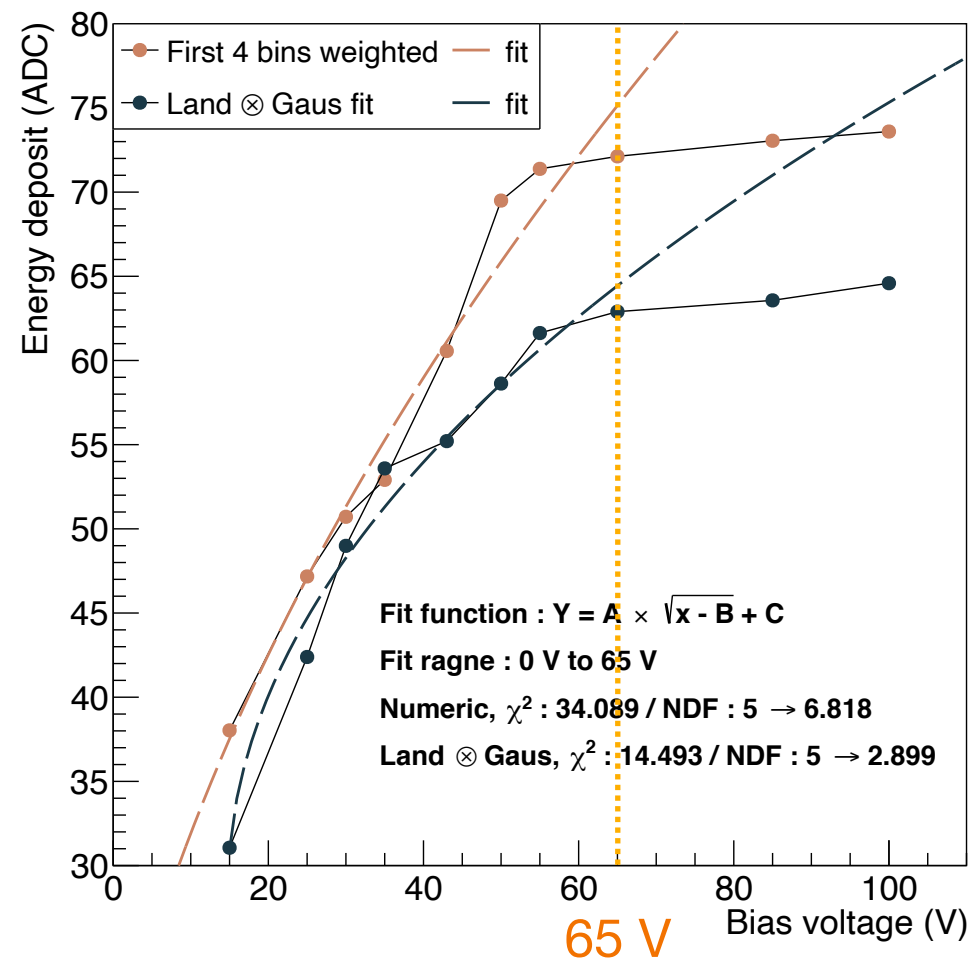
With Sci., chip id : 4, voltage : 100



# // Source test, different supply voltage

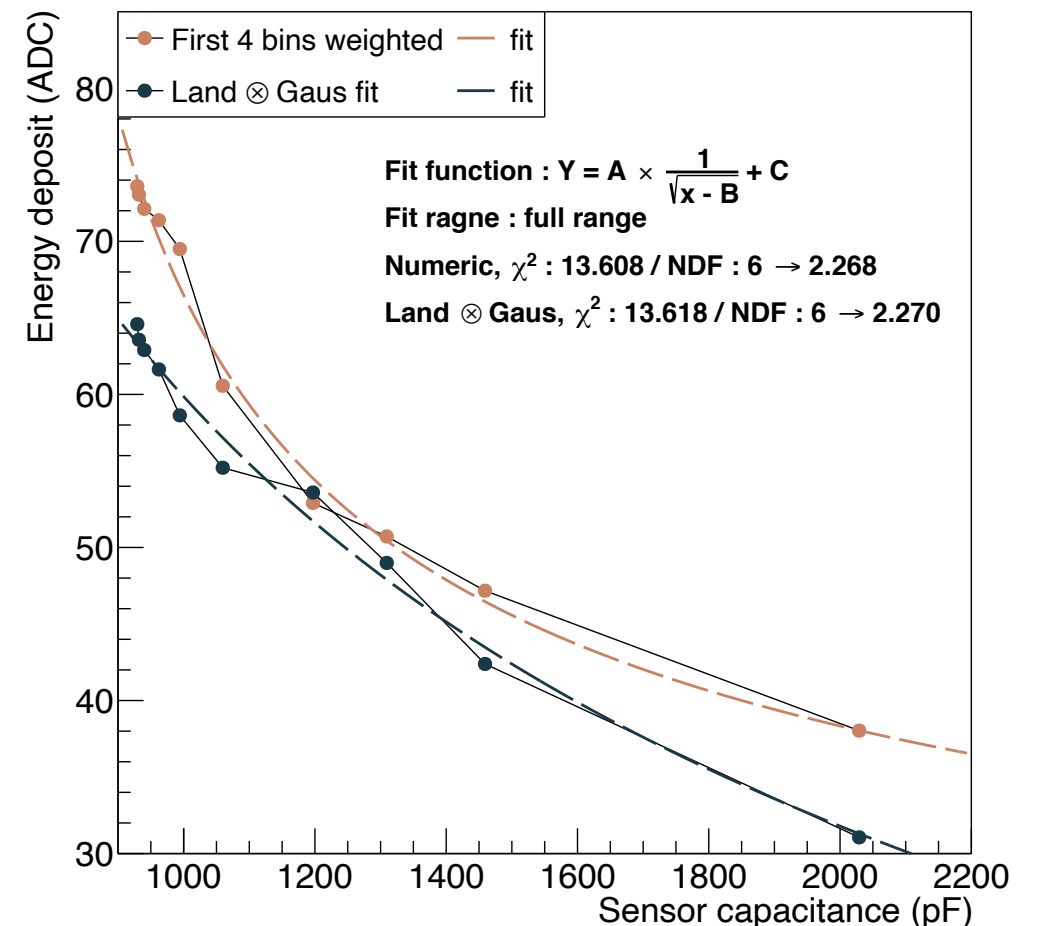
Upgrade : add the scintillator, more data points & customized adc setting for different run

Energy deposit v.s. Bias voltage



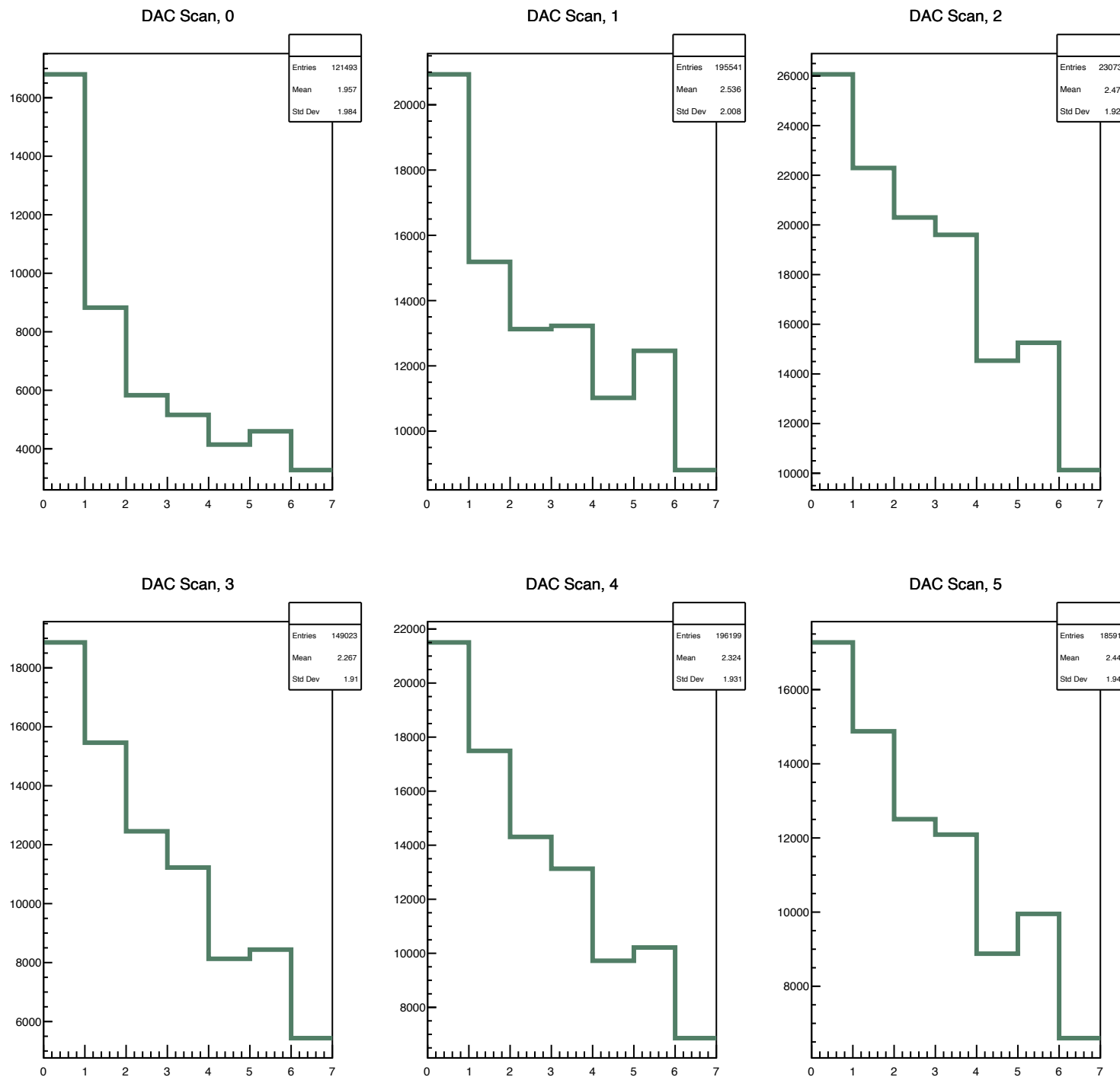
The result fits to our expectation, the discrepancy increases as the bias voltage is larger than 60 V. Because it gradually reaches to the limit of the depletion region

Energy deposit v.s. Sensor capacitance



For the case of capacitance, it is reasonable. The full range is considered for the fitting.

# // DAC Scan - Without external trigger



DAC scan setting

| 257  | current | ADC0 | ADC1 | ADC2 | ADC3 | ADC4 | ADC5 | ADC6 | ADC7 |
|------|---------|------|------|------|------|------|------|------|------|
| run1 | 0.13uA  | 20   | 24   | 28   | 32   | 36   | 40   | 44   | 48   |
| run2 | 0.146uA | 40   | 44   | 48   | 52   | 56   | 60   | 64   | 68   |
| run3 | 0.146uA | 60   | 64   | 68   | 72   | 76   | 80   | 84   | 88   |
| run4 | 0.147uA | 80   | 84   | 88   | 92   | 96   | 100  | 104  | 108  |
| run5 | 0.151uA | 100  | 104  | 108  | 112  | 116  | 120  | 124  | 128  |
| run6 | 0.152uA | 120  | 124  | 128  | 132  | 136  | 140  | 144  | 148  |

No evident peak appears  
The distributions are similar **WITH** external trigger

**Back up**