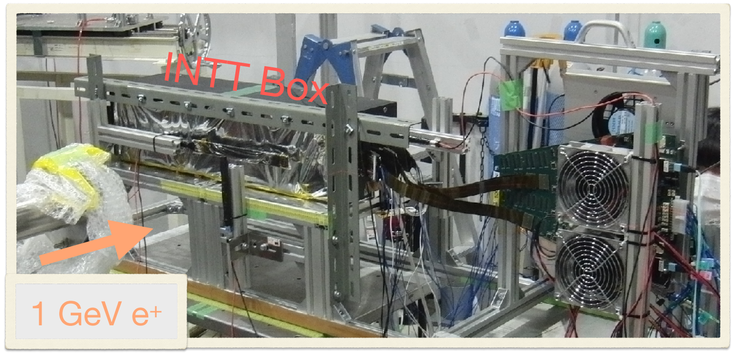
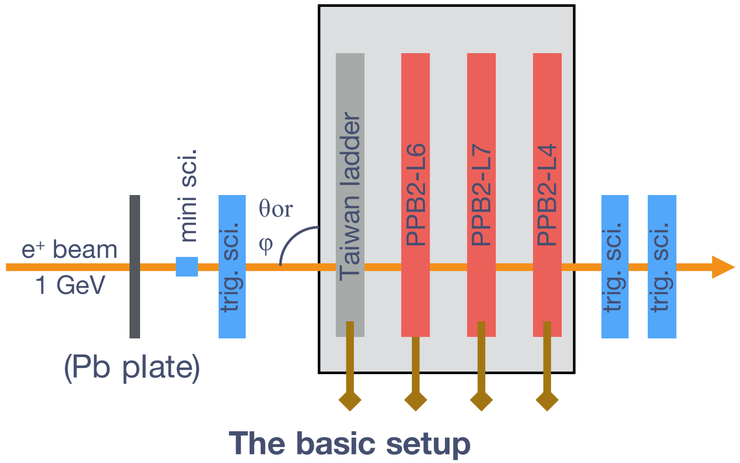
Status report

Cheng-Wei Shih, National Central University

Beam Test 2021 @ ELPH Tohoku

- Beam : Positron beam with energy of ~ 800 MeV
- Configuration : 3 layers of INTT ladders + 2 scintillators (trigger)
- Bias voltage : 50 V





The basic setup

Scope of publication

- INTT MIP distribution by DCA scan measurements
- Ladder detection efficiency
  - Efficiency + statistic + systematic
  - Efficiency as a function of position (uniformity)
- N track comparison (comparison of data and MC)
- Residual distribution (comparison of data and MC)

DAC Scan (previous, 2022 Jan. 20)

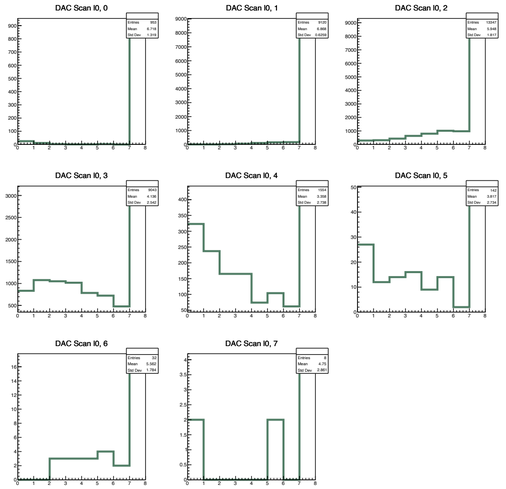
- Not included in the ELPH report

- Algorithm is same as Testbeam2019 :
  - 6th, 7th bins : histogram matching
  - 8th bin : overflow, neglect

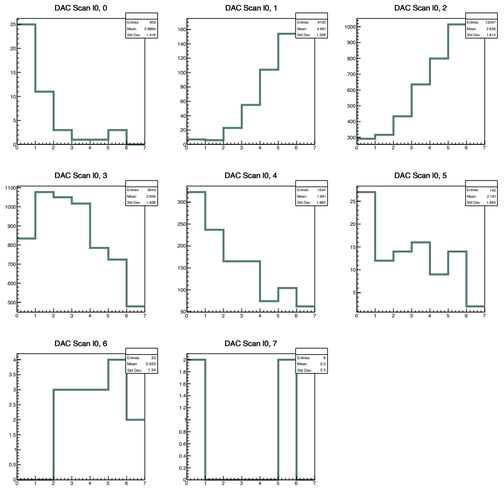
- Criteria :
  - Event profile has to be 111
  - single hit for each layer only

run1	run2	run3	run4	run5	run6	run7	run8
8	28	48	68	88	108	128	148
12	32	52	72	92	112	132	152
16	36	56	76	96	116	136	156
20	40	60	80	100	120	140	160
24	44	64	84	104	124	144	164
28	48	68	88	108	128	148	168
32	52	72	92	112	132	152	172
36	56	76	96	116	136	156	176
40	60	80	100	120	140	160	180

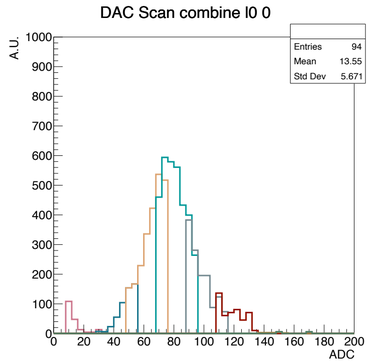
With 8th bin, L0

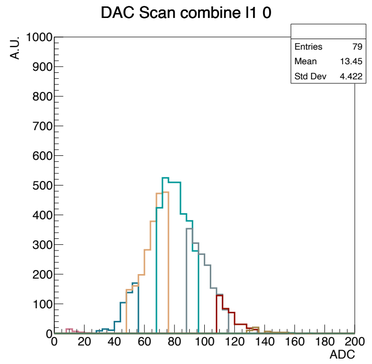


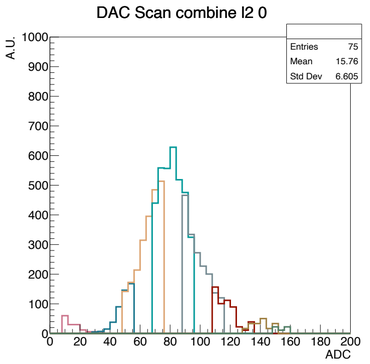
Without 8th bin, L0



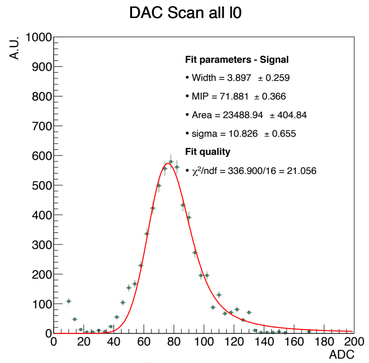
- Event profile has to be 111
- single hit for each layer only



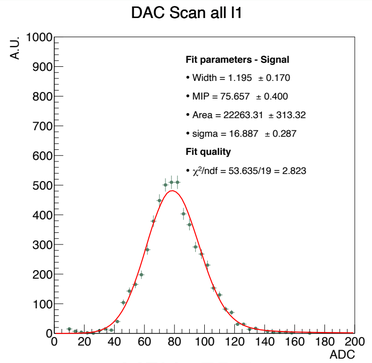




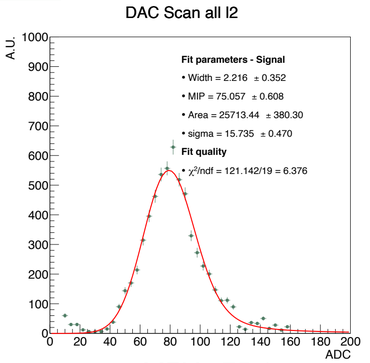
Fitting function : Landau convolute with Gaussian



MPV : 71.9



MPV : 75.7

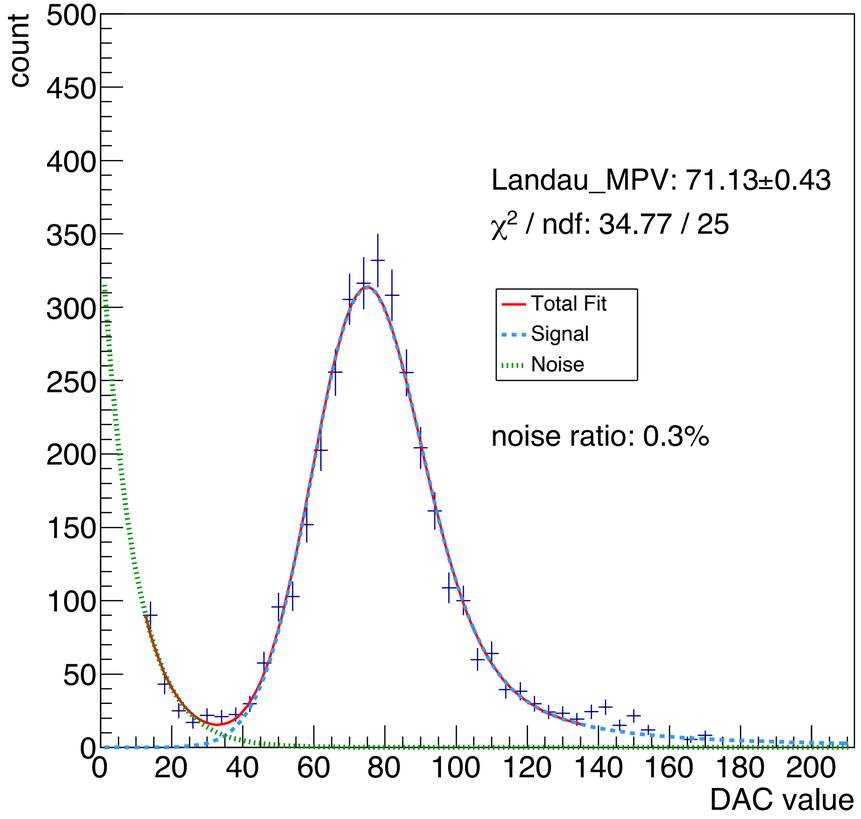


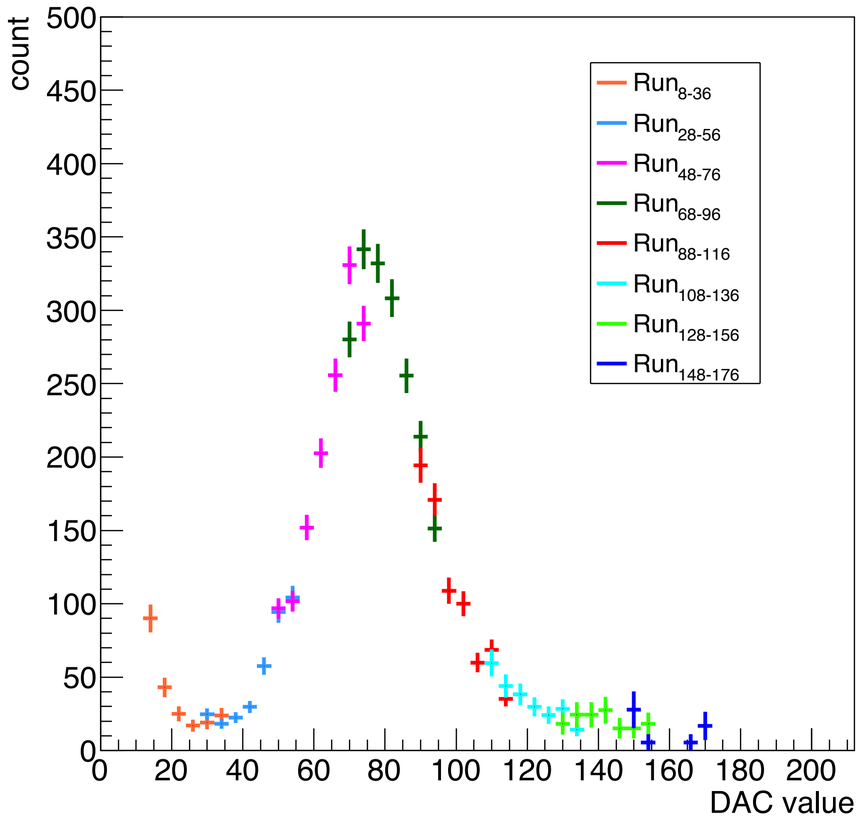
MPV : 75.1

It may not be consistent with the case with bias voltage 100 V applied. But it shows that the adc cut we applied can still keep > 99% of signal

DAC Scan by Yuka

- Included in the ELPH report





It may not be consistent with the case with bias voltage 100 V applied. But it shows that the adc cut we applied can still keep > 99% of signal

Ladder detection efficiency

- Included in the ELPH report

The detection efficiency in percentage was defined as Equation 3:

$$\frac{N(L0 \cap L1 \cap L2)}{N(L0 \cap L2)} \times 100\% = \frac{N_{\text{good}}}{N_{\text{good}} + N_{\text{far}} + N_{\text{no\_hit}}} \times 100\%.$$

The efficiency of ladder L1 was

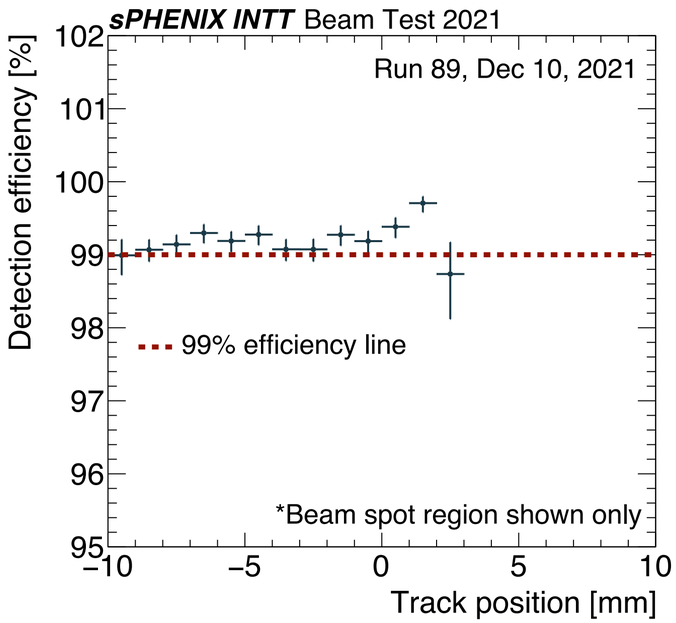
$$\frac{45498}{45498 + 186 + 123} \times 100 = 99.33\%.$$

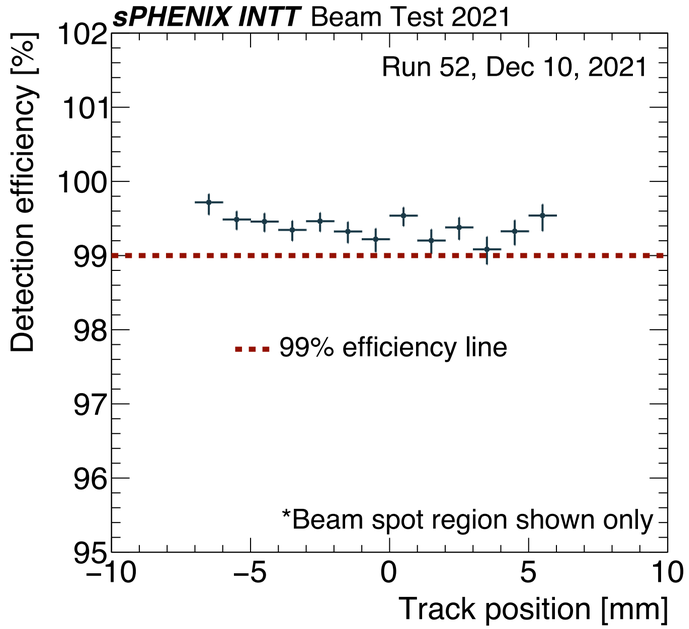
The statistical error was estimated using binomial distribution to be ± 0.04 %.

Sources	Scan range	Uncertainty (%)
Residual cut	0.164 mm–0.304 mm	0.063
Slope cut	0.0088–0.0112	3×10^{-3}
Edge effect	0 ch–10 ch	4×10^{-4}
Total		0.063

the detection efficiency of $99.33 \pm 0.04(\text{stat}) \pm 0.06(\text{sys})$ %

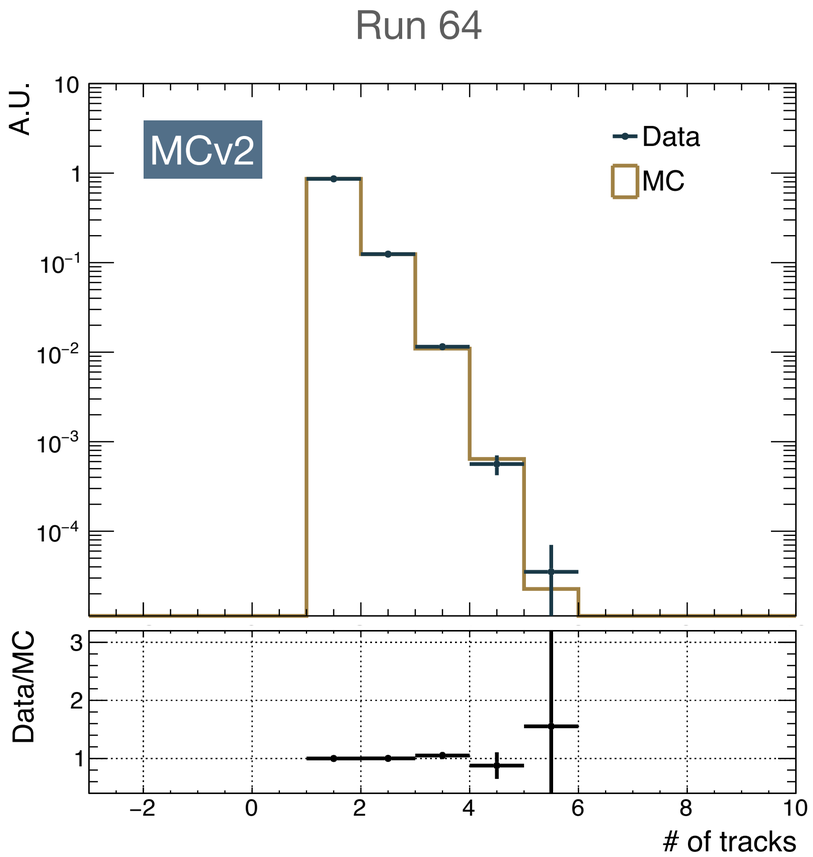
Error bars : statistics uncertainty





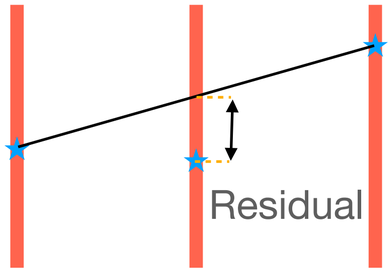
With lead plate, N of tracks

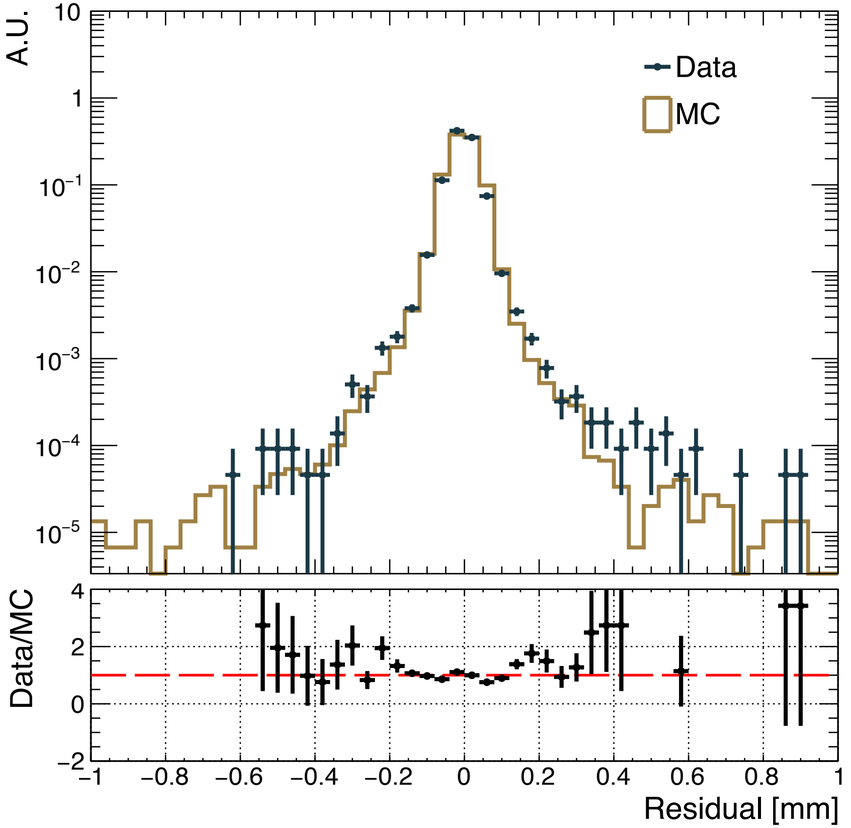
- Not included in the ELPH report
- Run 64 : a metal plate in front of the beam
  - Generates multiple tracks
- The plot : comparison between data and MC



Residual distribution

- Not included in the ELPH report
- Run 52, comparison between data and MC





QM2023 Proceeding

The Intermediate Silicon Tracker of sPHENIX

Cheng-Wei Shih[1,*] for the sPHENIX Collaboration

[1]Department of Physics, and Center for High Energy and High Field Physics, National Central University, Taoyuan, Taiwan

Abstract. The sPHENIX project is a new detector experiment at the Relativistic Heavy Ion Collider at BNL. Its aim is to study strongly interacting Quark-Gluon Plasma and cold-QCD by measuring photons, jets, jet correlations, and the Upsilon family with high precision. To achieve these goals, a precise tracking system is necessary. The tracking system of the sPHENIX detector consists of MVTX, TPC, TPOT, and the Intermediate Silicon Tracker (INTT). INTT is a two-layer barrel silicon tracker that plays a unique role among the tracking detectors. It is capable of bridging the tracks of MVTX and TPC. In addition, its precise timing resolution enables INTT to associate individual tracks and events to eliminate pile-up events. The INTT barrel installation and cabling were completed in March 2023. We have since commissioned and confirmed installation procedures and detector responses. The INTT status, and performance evaluation by beams and cosmic rays are presented in this talk.

1 Introduction

Your text comes here. Separate text sections with

2 Section title

For bibliography use [1]

2.1 Subsection title

Don't forget to give each section, subsection, subsubsection, and paragraph a unique label (see Sect. 2).

For one-column wide figures use syntax of figure 1

Figure 1. Please write your figure caption here

For two-column wide figures use syntax of figure 2
For figure with sidecaption legend use syntax of figure
For tables use syntax in table 1.

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