

NEOLITH-s parasite experiment preparation

Reports on Neolith project (Sato prepared)

http://be.nucl.ap.titech.ac.jp/~satou/docs/neutron_detector/neut_det.html

2025.04.16

As of 2025.06.06

Experimental outline

- Date : End of June~early July(June 29~July 4) → 6/26~7/1
- Purpose : Examine the response of Neolith-s (second prototype) on the incidence of high energy neutrons
- Carry out the measurement as a parasite experiment of the Kubota experiment at the samurai installation of RIBF
 - Place the setup downstream of the beam dump

Response evaluation of Neolith-s for the incidence of high-energy neutrons by using simulation codes

←to be confirmed by the measurement

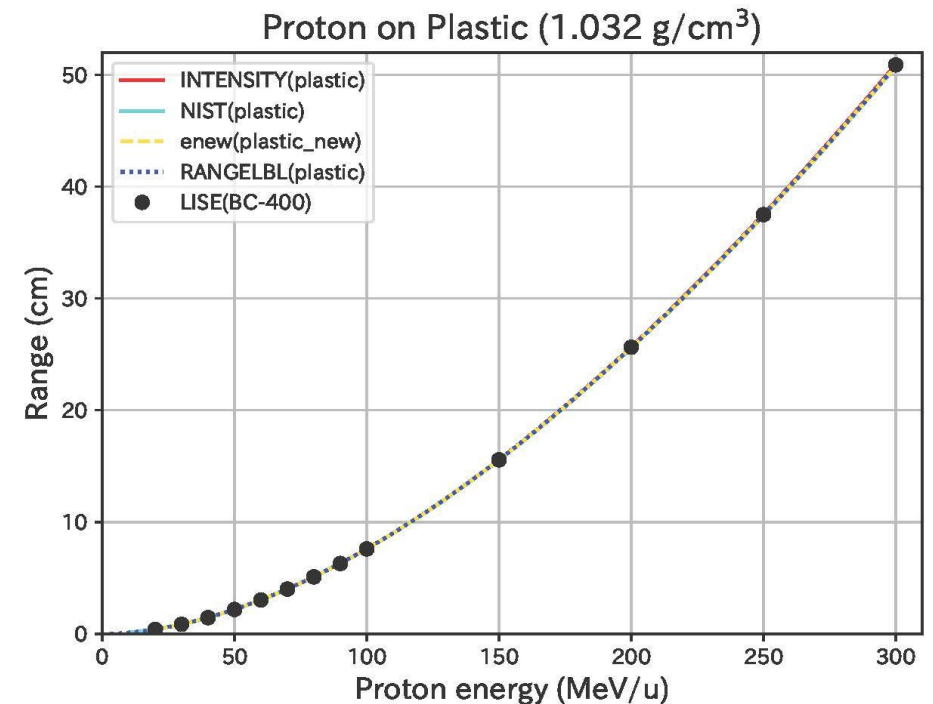
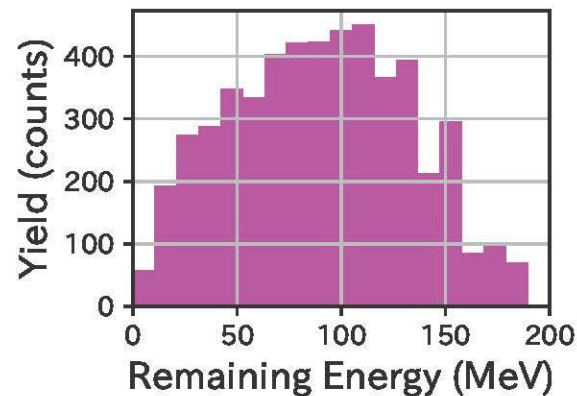
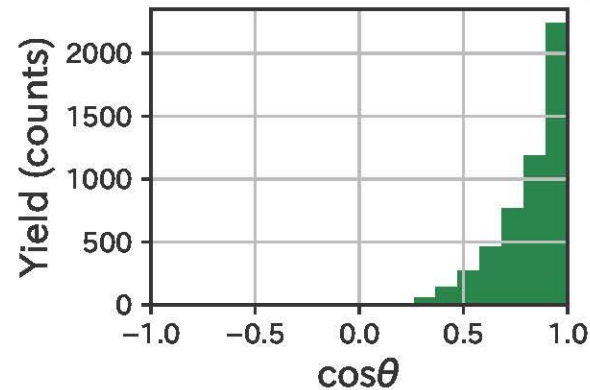
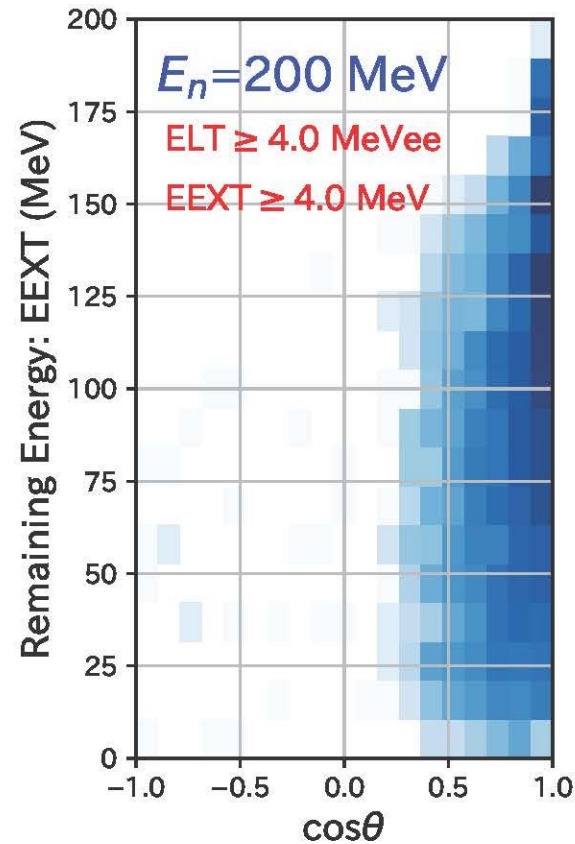
- **Ex.** Charged particles escaping the scint. boundary

Code: CECIL

Scintillator thickness: 15 cm

Document:

http://be.nucl.ap.titech.ac.jp/~satou/docs/neutron_detector/neut2024_ed.pdf

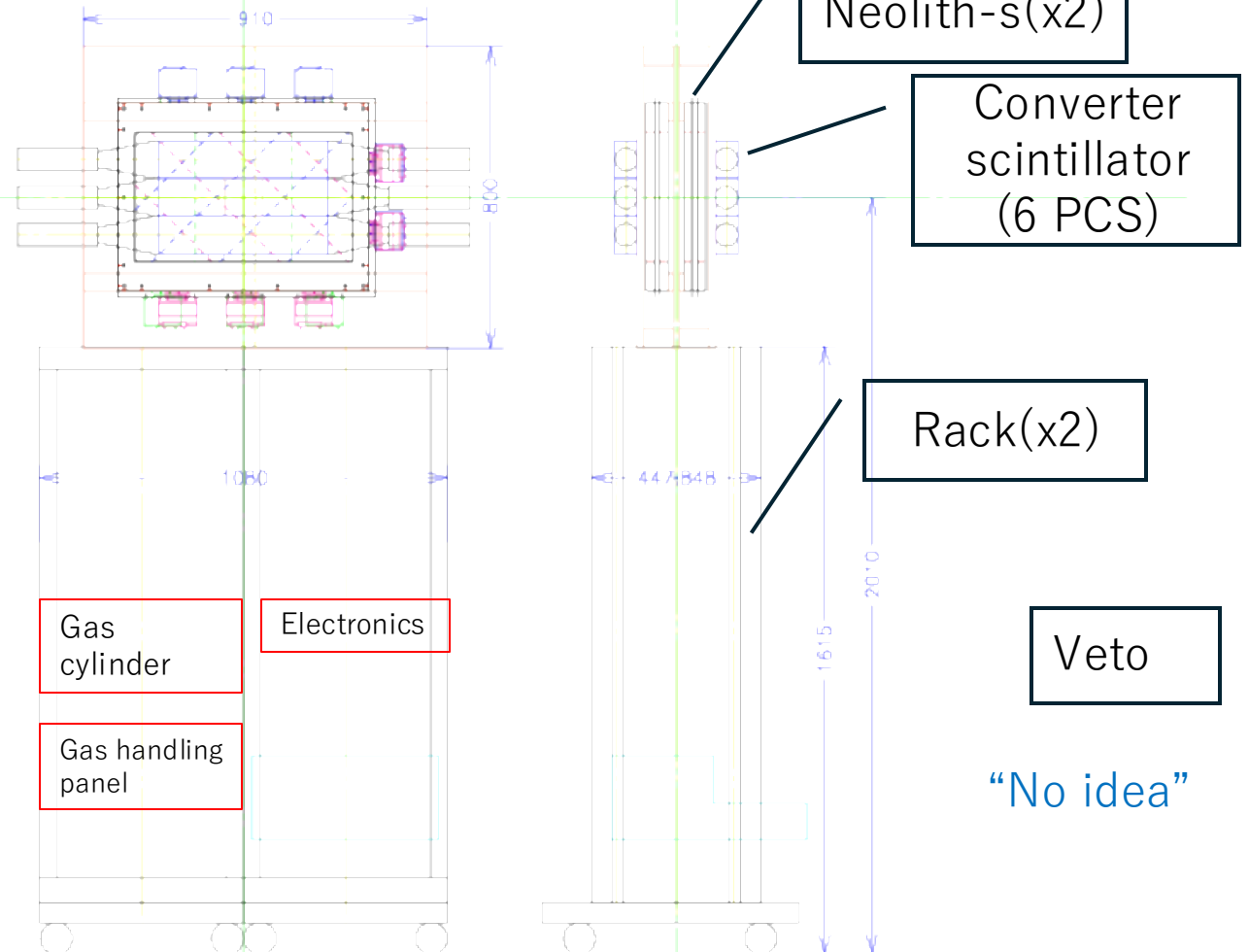


Setup outline

By T. Kobayashi
2025.03.17/21

✖ Emphasis is placed on
ease of setup transfer

Rack (x2)	lead ox-30u →DIY	
Neolith-s (x2)	Sensitive area 577x342 mm ²	#ch=16x1 3x2=461
Converter scintillator (x6)	450(L)x100(W) x60(D) mm ³ 3本x2 Sensitive area 450x300 mm ²	#ch=2x6= 12
Veto [(x7)]	Larger than 600x360 mm ²	[#ch=2x7 =14]

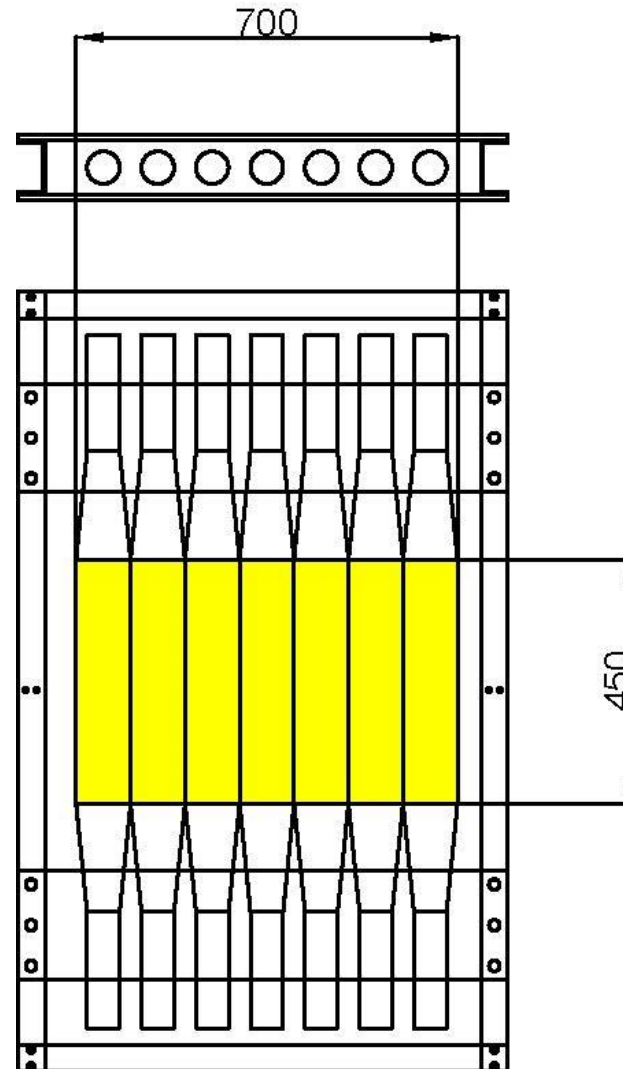


Veto counter candidates

- A 2007 model of HOD designed at TITech Nakamura-lab.
Consisting of 7 plastic scintillators with a thickness of 5 mm

- 1 cm-thick former RIPS HOD (if placed not normally to the beam, the passage of charged particles through the gap can be avoided.)
 - Needing tests: light protection, gain adjust etc.

By Makimura



※ Adjacent plastics can be repositioned so that they overlap each other by 2 mm. This is necessary to eliminate the slip-through of charged particles and to provide a veto function.

※ Fulfilling the required sensitive area of more than 600x360 mm².

2007 HOD specification document:

http://be.nucl.ap.titech.ac.jp/~satou/docs/neutron_detector/hodo_sasae_buhin.pdf

Things to do (design)

☒ Veto frame support

- Divert HOD manufactured by TITech in 2007, consisting of seven 5 mm-thick scintillators.
- Adjacent scintillators can be arranged so that they have 2 mm-wide overlap regions (confirmed in 2025.04.14).
- Sensitive area becomes $45 \times 688 \text{ cm}^2$

☐ NEOLITH-s support (including the support of the converter scintillators)

- Base will be provided by Lead OX-30U racks (proposed by T.Kobayashi) → Base is MISUMI DIY frame; detector stage (Kobayashi design) will arrive after 6/11, scint stage will be a wooden one.

~~• HIMAC CATANA base is another choice~~

☒ Gas handling panel (design & manufacturing) → Flow meter needs two months for delivery; prepare for the next chance.

Things to do (purchase)

☑ Necessary amount of BNC • SHV cables

- Enough 6 m BNC cables from Nebula stock 2024.05.01. 16 SHV cables (5 m) have been secured at Nakamura-lab 2024.05.13. No need to secure cables for Veto.

☐ Data transfer flat cables ~~(6~8 m)~~ (26+4=30 PSC, 4 m)

- MISUMI, fusion splicing (融着), crimping operation by ourselves → 13 pcs purchased for test 2025.05.07. 17 pcs purchased in 2025.05.03.

☑ Pre-amp power cables ~~(6~8 m)~~ (26+4=30 PSC, 4 m)

- Crimping operation by ourselves, existing 26 PSC are all 4 m; replace 10 of them with shielded ones. Add 12 PCS by 2025.05.30.

☑ V1190 adapter (16chx2 → 32ch) (16 PSC, including those for reference signals)

- Asking quotation 2025.04.16.
- Make ourselves, twenty P50E-068S-EA connectors & one TPFLEX-N 17P-7 reel purchased 2025.05.12. Fabrication completed in 2025.05.28.

☑ Lead OX-30U rack, 2 PSC (One exists in the room 109) → Parts purchased via MISUMI, assembling finished in 2025.05.23.

☑ 10L P20 gasx1

- Asking quotation 2025.05.08 Suzuki shokan. Quotation price: ¥44,000. Make a purchase request to Otsu-san in 2025.05.14. To arrive at RIKEN on 2025.06.17. Use ISCT regulator.

Things to do (operation)

- ☑ Securing photo-multiplier tubes (PMTs) (13 PSC as of 2025.04.14)
- ☑ Finding out a veto counter candidate (2025.04.14)
- ☑ Veto scintillator signal test (14ch) (done 2025.04.14)
- ☑ Attaching 12 PMTs to the 6 PSC of the converter scintillators (using optical grease), signal test. → Use optical cement.
 - Black sheet may have holes; light shielding reinforcement is required.
- ☑ Reattachment of veto scintillators (HOD-1D & -3D) that have been unglued (using optical cement). Additional repair of 2D&4D done 2025.05.01.
- ☑ Evaluating the power consumption
 - By Sisir-kun: for the ISCT setup (7.31 A), the RIKEN setup (8.37 A)

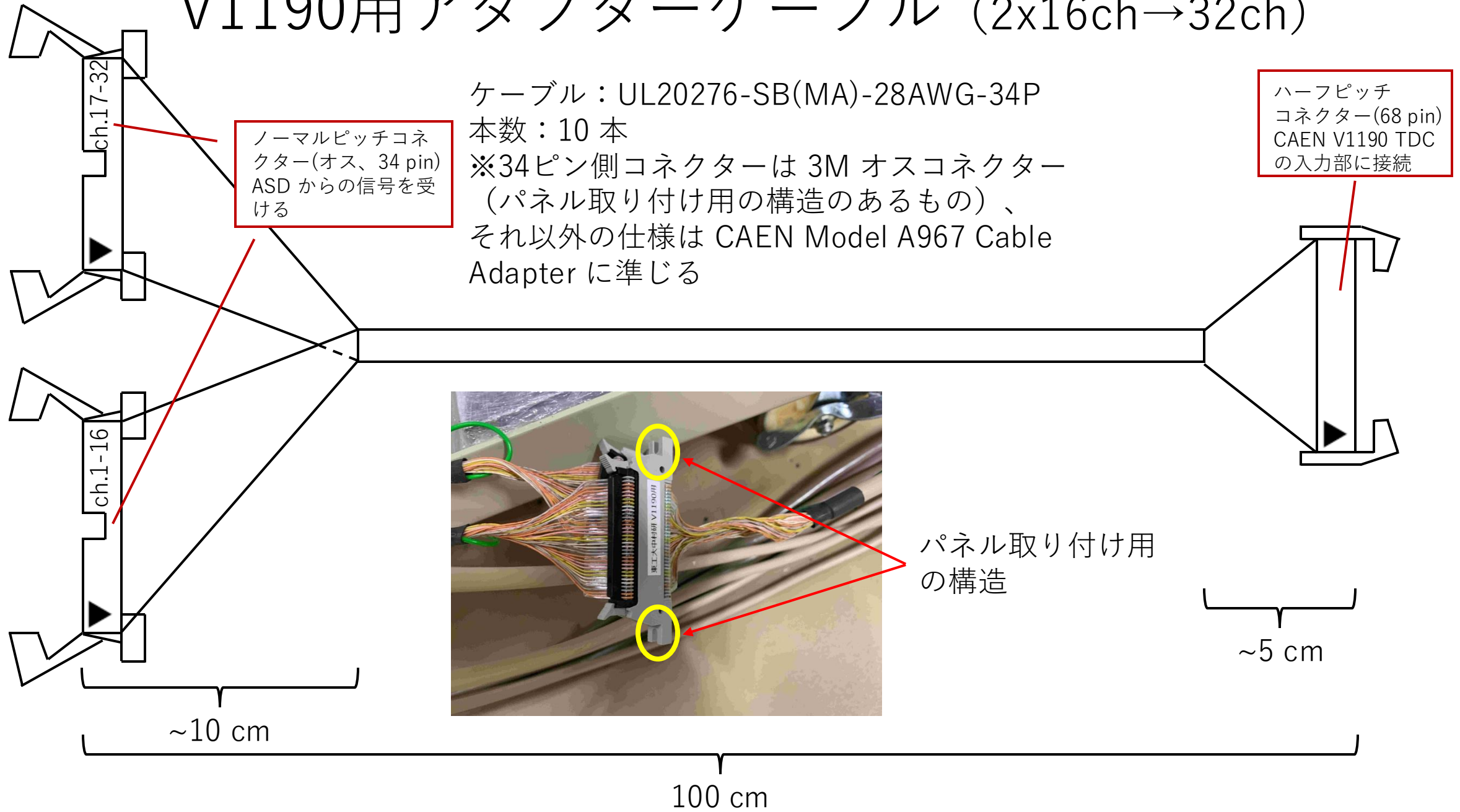
Things to do (operation, continuation)

- ☑ Dr. Kondo is in charge of creating the detection efficiency monitoring software
 - Efficiency measurement data, in the ridf format, taken with the $\text{ArCH}_4(10\%)$ gas at ISCT was shipped to him 2024.04.16
- ☑ Beam trajectory calculations(Hanai)
- ☐ Consider the usage of QTC (charge to time converter) for better estimation of the deposited charges inside the converter scintillators (We want to know the ToT-Charge correlation, Deploy as discriminator) → 4413 for Discr? Then charge may not be measured.
- ☐ Build a remote control environment for iseg's high-voltage power supply
- ☐ Evaluation of Neolith's responses (upon incidence of neutrons) using simulation codes
- ☑ Comparison of the Y resolution between 8 mm wide and 10 mm wide cathodes (Cathode exchange: 8 → 10 mm, start cosmic ray run 2025.04.24)
- ☐ Electronics modules collection and trigger circuit assembly

Things to do (operation, continuation)

- ☑ Keep accommodation in advance (let Ohno-san know the price) → Deal with it oneself → take care of the 3 days (forward) shift in the machine time
- ☑ Make timeline 2025.05.30
- ☑ Secure HV modules (as early as possible, find a fluke 5 kV, 50 mA power supply) → would be ready 2025.05.01
- ~~☑~~ Newcomers can work as temporary visitors (in May, but until 24H before beam irradiation, an MT starts from 5/11)
- ☑ Take efficiency curves of Neolith-s at samurai using cosmic rays 2025.05.13
 - cf.) ISCT&Samurai efficiency results
- ☐ Take efficiency curves at twice as large a threshold

V1190用アダプターケーブル (2x16ch→32ch)

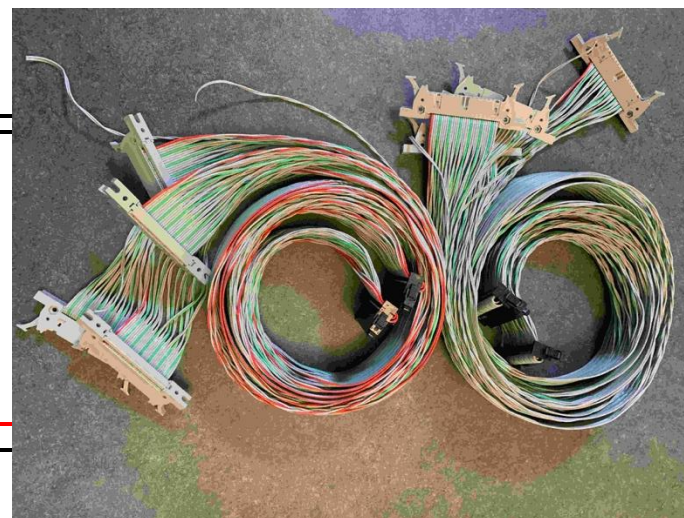
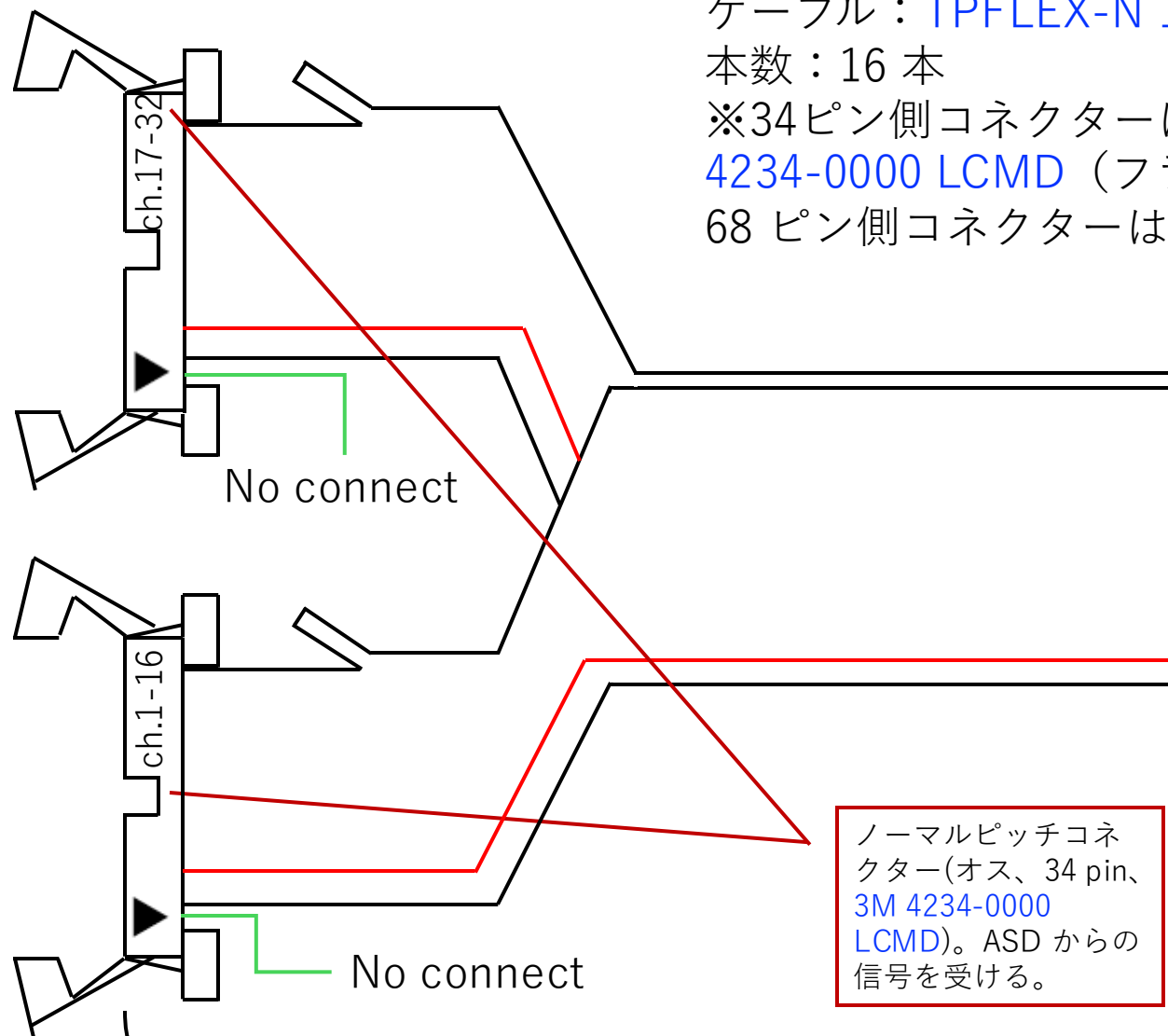


V1190用アダプターケーブル(V2) (2x16ch→32ch)

ケーブル：TPFLEX-N 17P-7/0.127-250 20591

本数：16 本

※34ピン側コネクタは 3M オスコネクタ：3M 4234-0000 LCMD (フランジ付、クリップ付)、
68 ピン側コネクタは、3M-P50E-068S-EA。



ハーフピッチ
コネクタ(68 pin、
3M-P50E-068S-EA)。
V1190 に接続。

ノーマルピッチコネ
クター(オス、34 pin、
3M 4234-0000
LCMD)。ASD からの
信号を受ける。

※ To match the channel numbers in both the ASD and V1190 connector sides, shift by a pair (one channel) is introduced at the 3M 4234-0000 LCMD connector.

100 cm

Data transfer flat cable

- MISUMI FNA20276-1.27FF-17P-4-1E 13 PCS (adjacent leads are spliced) purchased. Additional 17 PCS purchased.



Length : 4 m
Splicing : both ends
Shield lead : one side
price : 3064 yen (1 piece)

中村研究室
佐藤

<https://www.vertex42.com/ExcelTemplates/simple-gantt-chart.html>

プロジェクトの開始:

月, 2025/5/26

週表示:

1

[illegible]