

Detection efficiency measurement of the trigger counters for MuSIC beam tests

Izyan Hazwani Hashim

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Kunolab

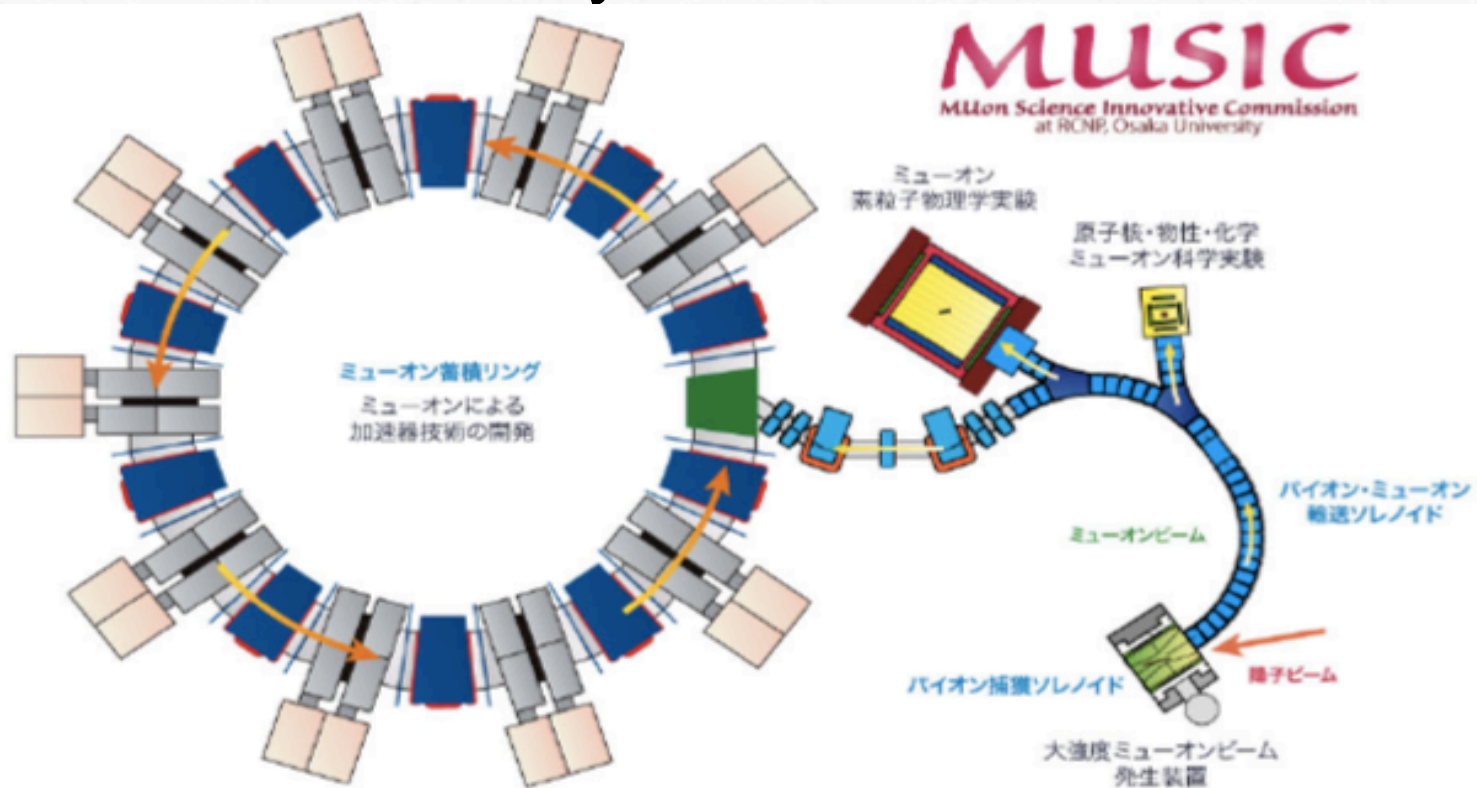
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Outline

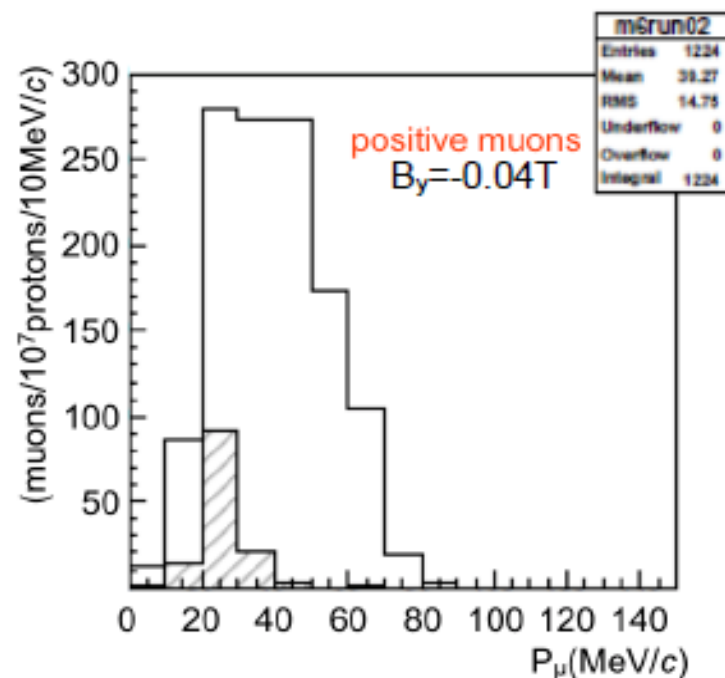
- Introduction
- Experimental setup
- Trigger logic
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Introduction

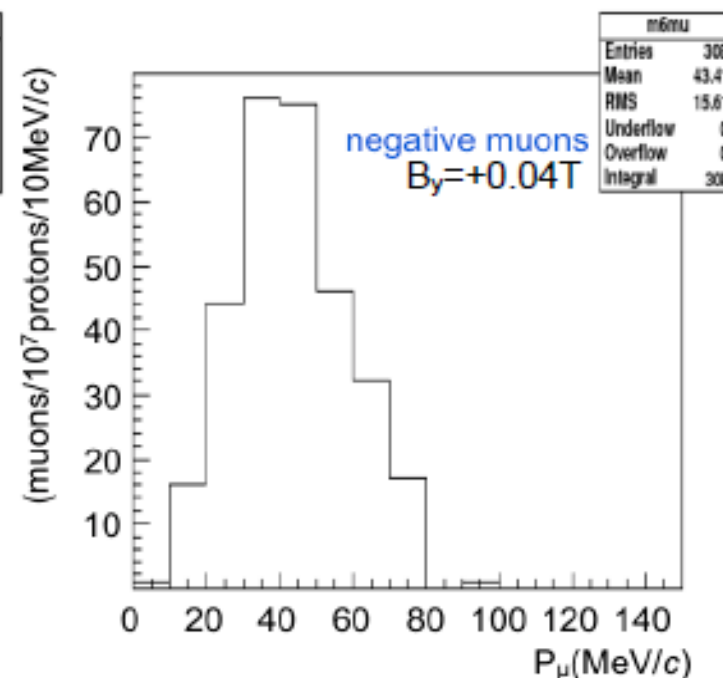
- MuSIC facility was constructed in RCNP, Osaka University.



Muon yield estimation

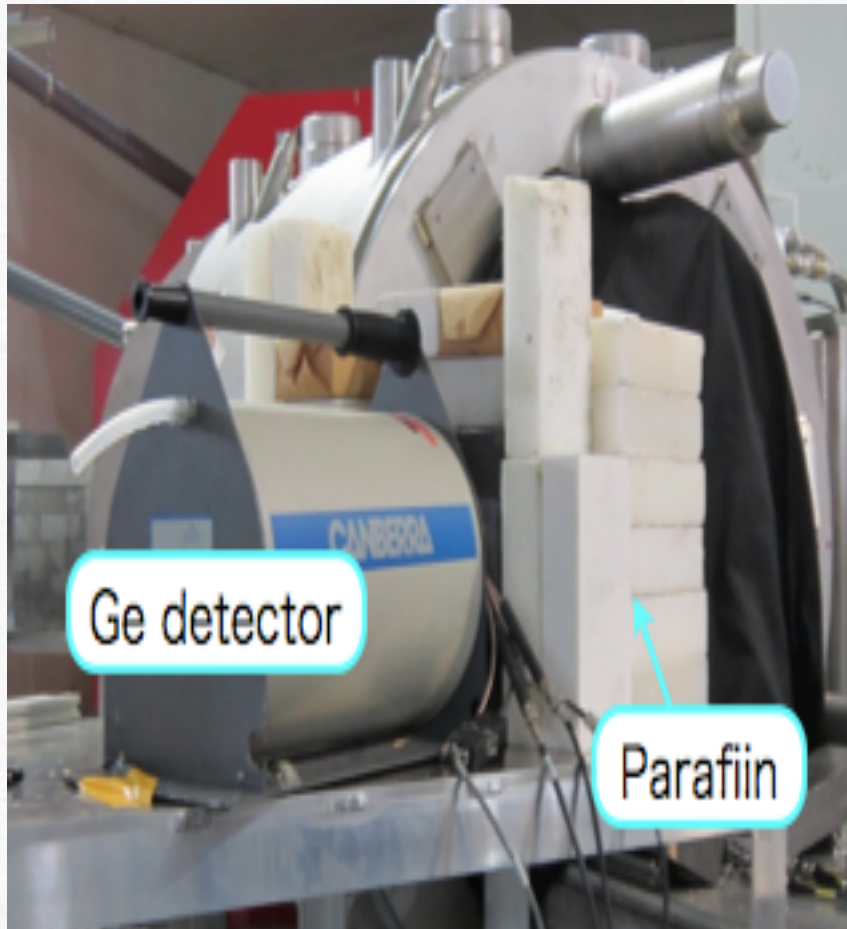


$8 \times 10^8 \mu^+/\text{sec}$
for 400MeV, 1 μA proton beam



$2 \times 10^8 \mu^-/\text{sec}$
for 400MeV, 1 μA proton beam

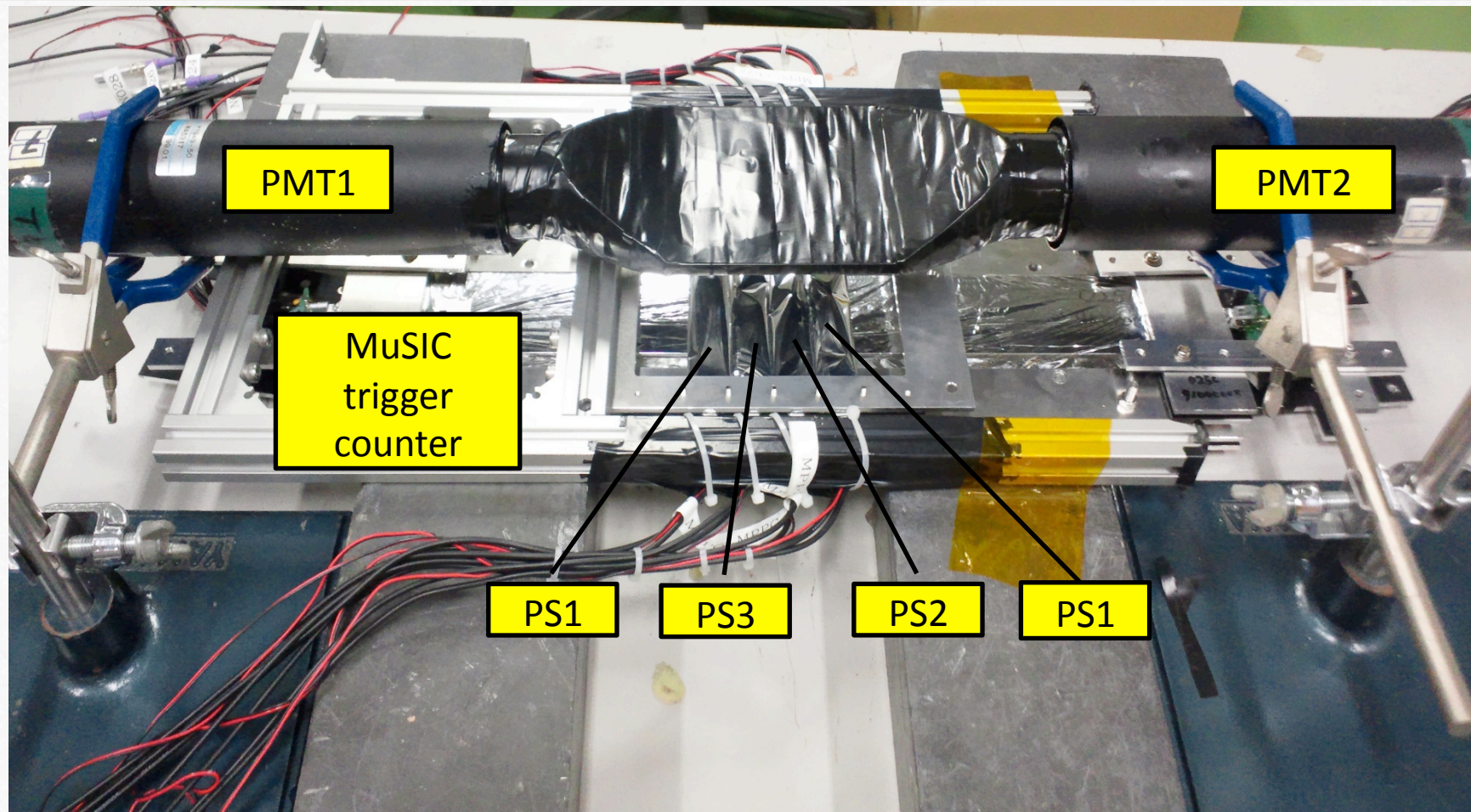
Number of μ^+/μ^- produced by can be measure by:



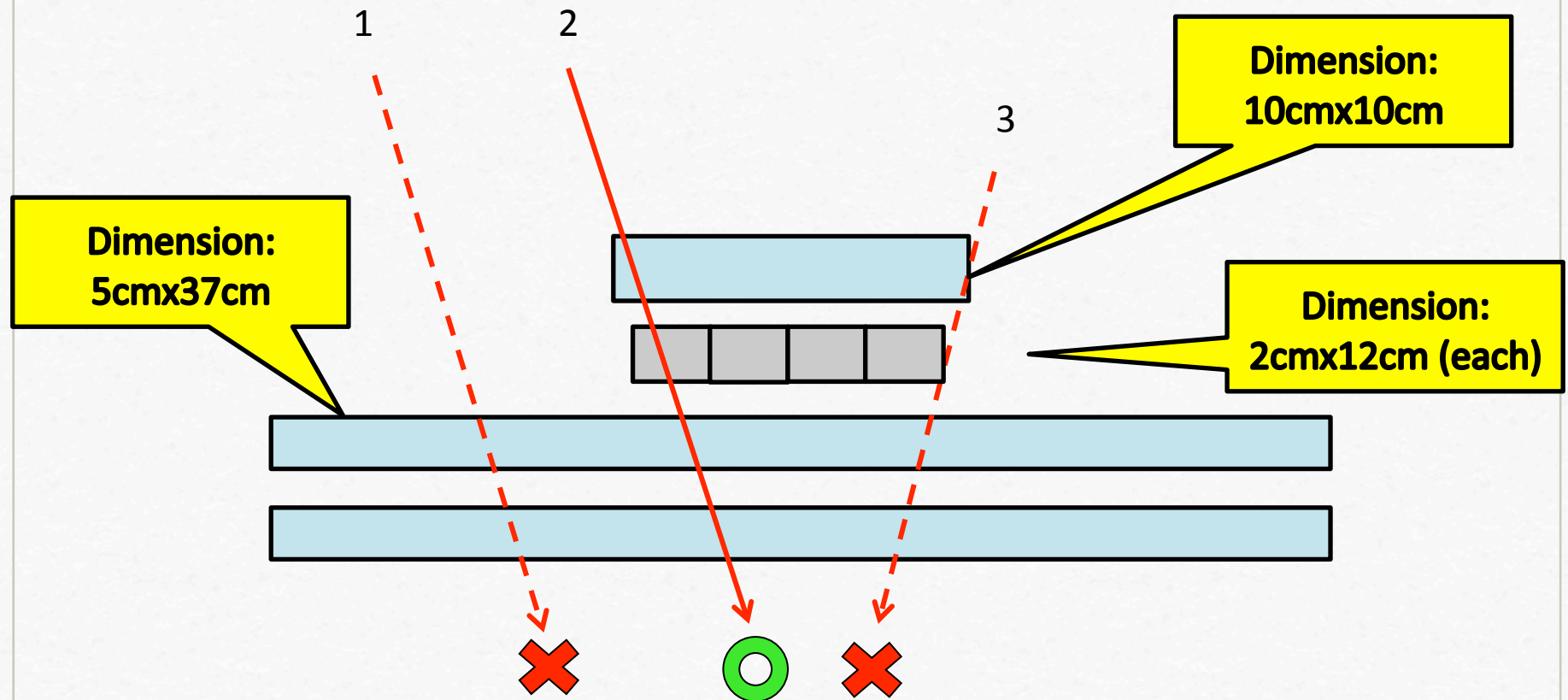
- Lifetime measurement
 - Trigger counter, Mg target
- Muonic X-ray measurement
 - Trigger counter, Mg target, Ge detector.

- The purpose of this study is to determine the efficiency and position dependence of the detector that is used in MuSIC beam test.
- Why?
 - Precise estimation of solid angle
 - Detection efficiency of counters in particular position dependence.

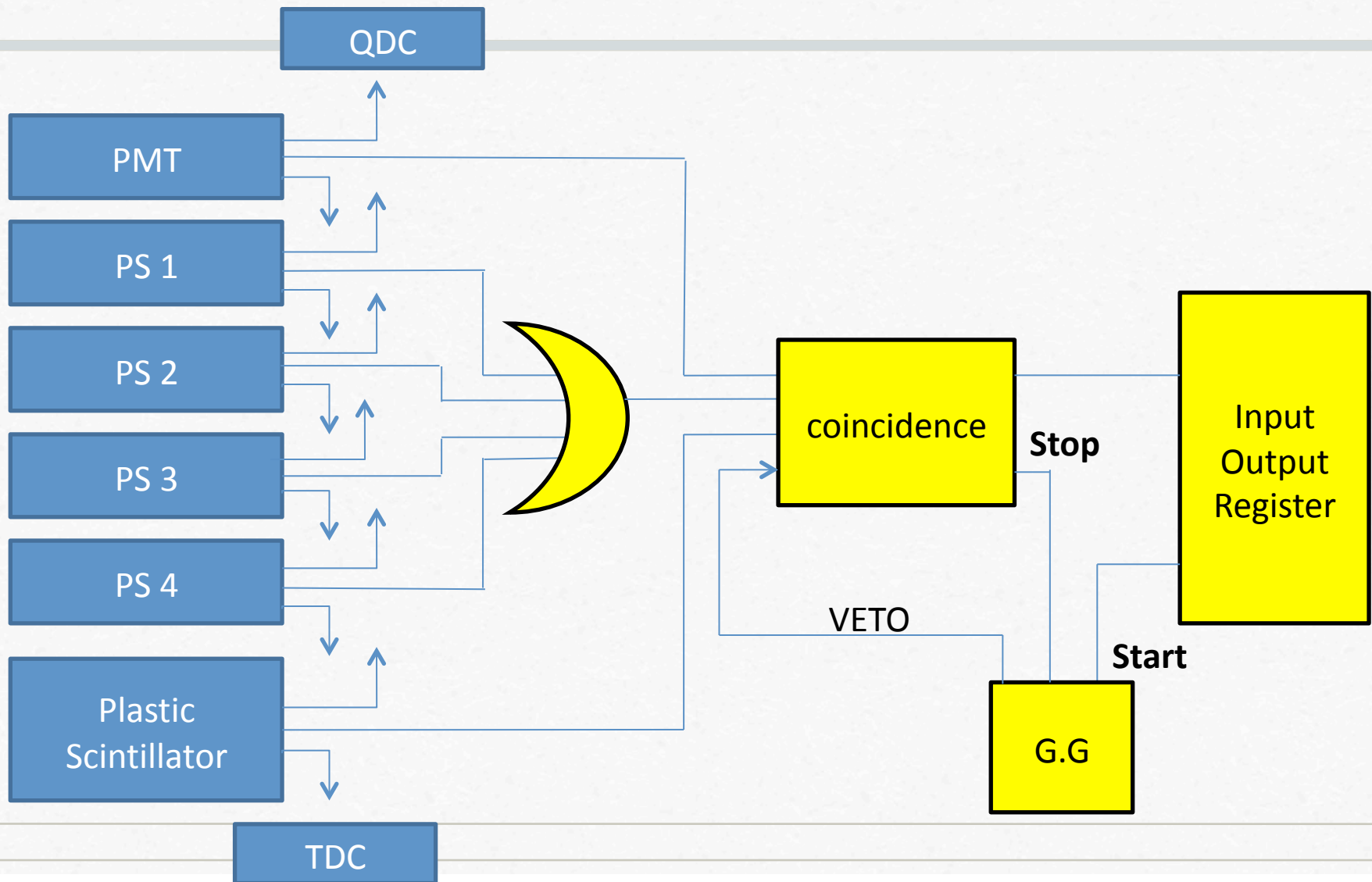
Experimental Setup



Possible hits



Trigger Logic

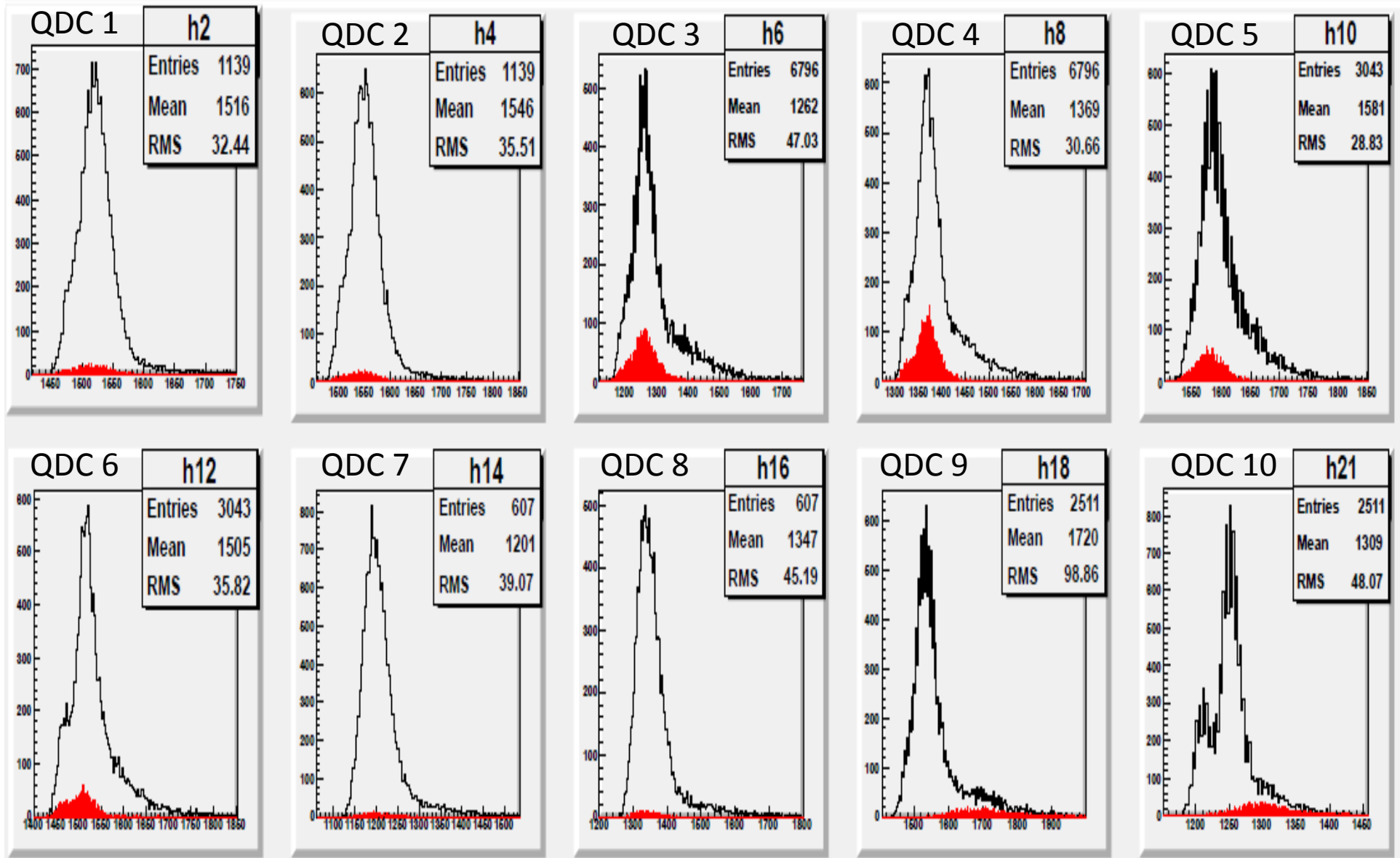


Results

- Current status: only attached PMT, Strip Scintillator & top counter.
- Efficiency of the detector can be calculated:

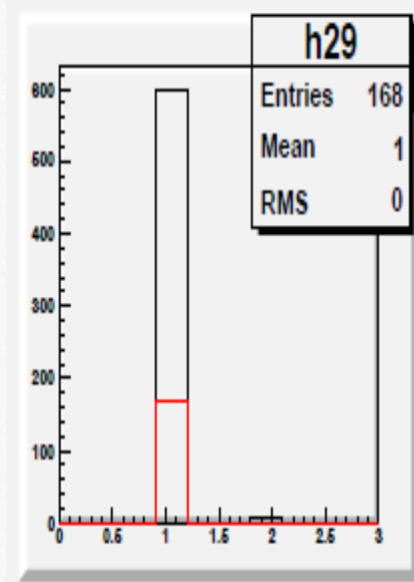
$$\text{Efficiency} = \frac{\text{No. of hits PS1/PS2/PS3/PS4}}{\text{Total hits on Trigger Counter}} \times 100\%$$

Cosmic Ray

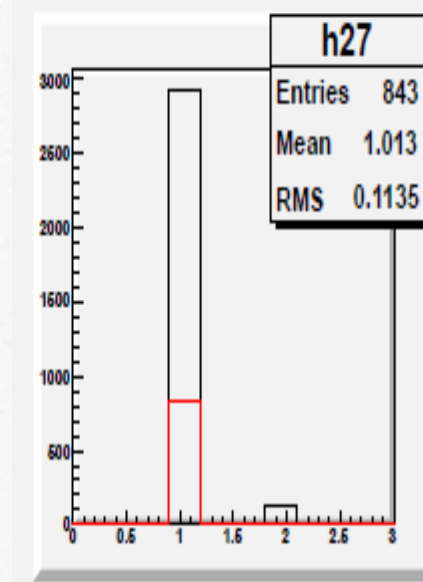


No of hit corresponds to each PS

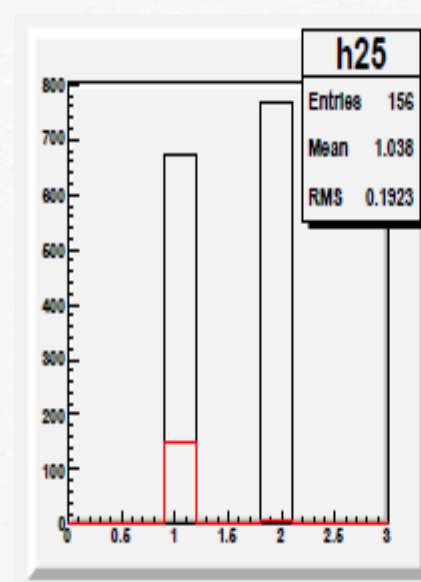
No of hits PS 1



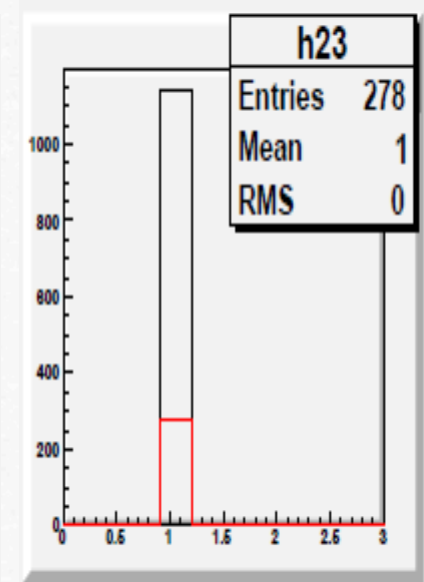
No of hits PS 2



No of hits PS 3



No of hits PS 4



- Hit on PS
- Hit on both PS & TC

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Efficiency

	Hit on PS	Hit on PS & TC	Efficiency (%)
PS1	1139	278	27.7
PS2	6796	156	28.5
PS3	3043	843	16.5
PS4	607	168	24.8

Since the size of PS and MuSIC Trigger counter is different, the efficiency is low.

Summary

- A new high intensity muon beam line is under construction at Osaka University, and is expected to provide 10^8 muons/sec (both μ^+ and μ^-).
- The detector efficiency should be uniform to get better and efficient number of muon yield.

Next To Do

- Take data with 4 counters
- Improve efficiency of detector

**THANK YOU FOR YOUR
ATTENTION**