News from AC-LGAD activity

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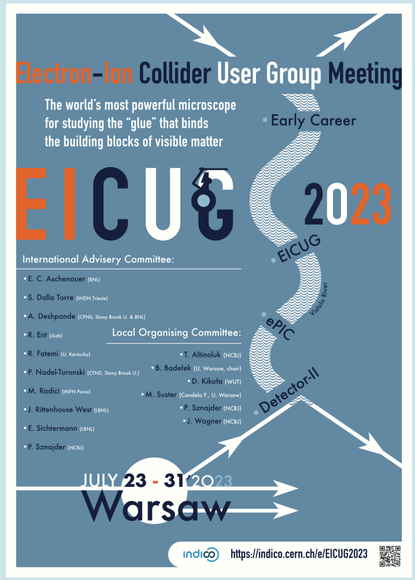
RHIC and AGS Annual User's Meeting

08/24/2023

HIROSHIMA

EICUG meeting @ Warsaw

- 07/25-07/29 @ Warsaw University
  - EIC + ePIC sessions
- Goto-san, Shigaki-san, and Yano (3/110)
- Commissioning and detector R&D status
- DSC-AC-LGAD-TOF by Zhenyu (& Yano)
- Session chair of last day by Yano
- Met with Zhenyu and discuss TOF future and shared Japanese group intension



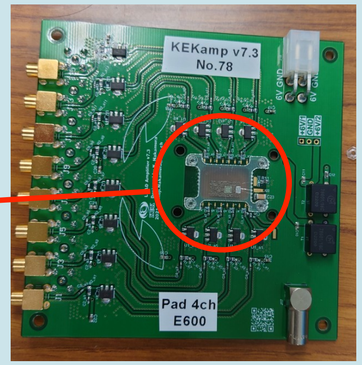
SUNDAY 23 JUL	MONDAY 24 JUL	TUESDAY 25 JUL	WEDNESDAY 26 JUL	THURSDAY 27 JUL	FRIDAY 28 JUL	SATURDAY 29 JUL	SUNDAY 30 JUL	MONDAY 31 JUL
Early Career Workshop	Early Career Workshop	EIC	EIC	ePIC	ePIC	ePIC	Trip 3	Det II / IP8
Early Career Workshop	Early Career Workshop	EIC	ePIC evening: Conference Dinner	ePIC evening: Trip 1	ePIC	Trip 2	Det II / IP8	Det II / IP8

AC-LGAD activity @ KEK

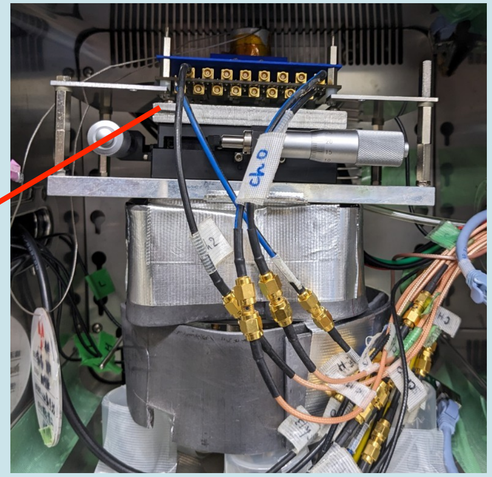
- 08/07-08/10 @ KEK with Nakamura-san
- Kawade-san (Shinshu Univ.), Matsutani-kun (Hiroshima Univ.), and Yano
- We learned how to proceed the AC-LGAD R&D

AC-LGAD

Amp board



Test bench



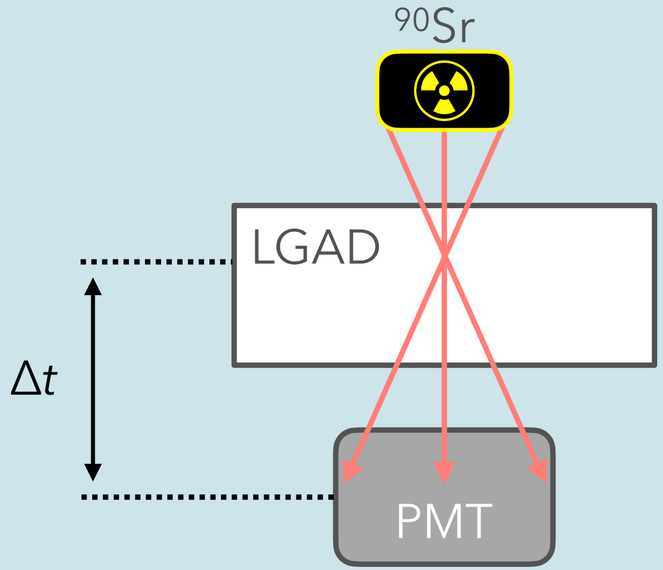
Test setup

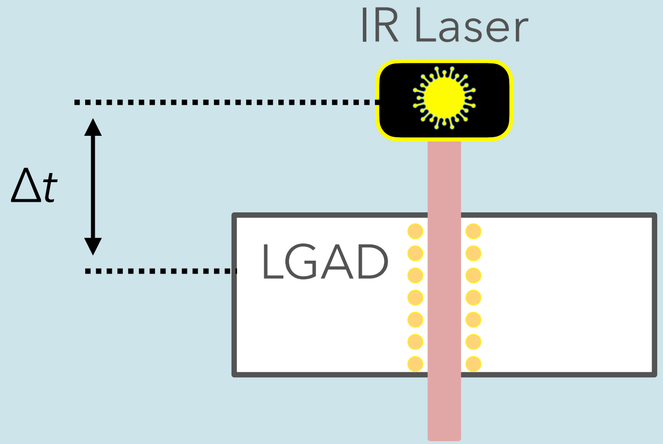
AC-LGAD R&D method

- Radiation source (^{90}Sr O(1) MeV)
  - MIP is available (realistic S/N)
  - It is difficult to control path length (worse timing resolution than realistic)
  - Easiest test bench setup

- IR laser
  - Signal magnitude can be controlled with laser strength
  - Landau fluctuation noise doesn't exist (better timing resolution than MIP)
  - It is easy to control positioning and reference timing

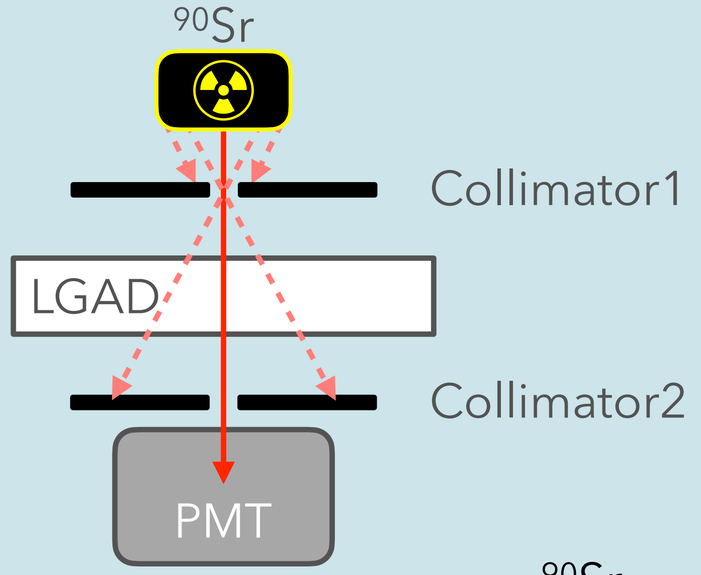
- Beam (O(1-100) GeV/c)
  - MIP is available (realistic S/N)
  - Injected position can be measured by an additional telescope system
  - Most accurate test but cannot be operated often

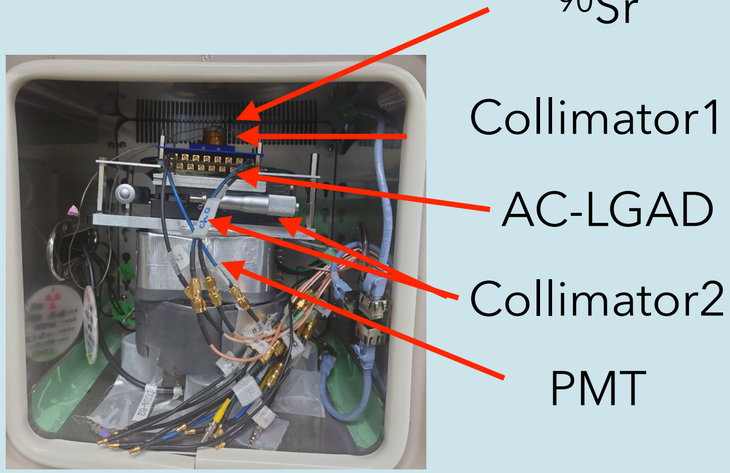


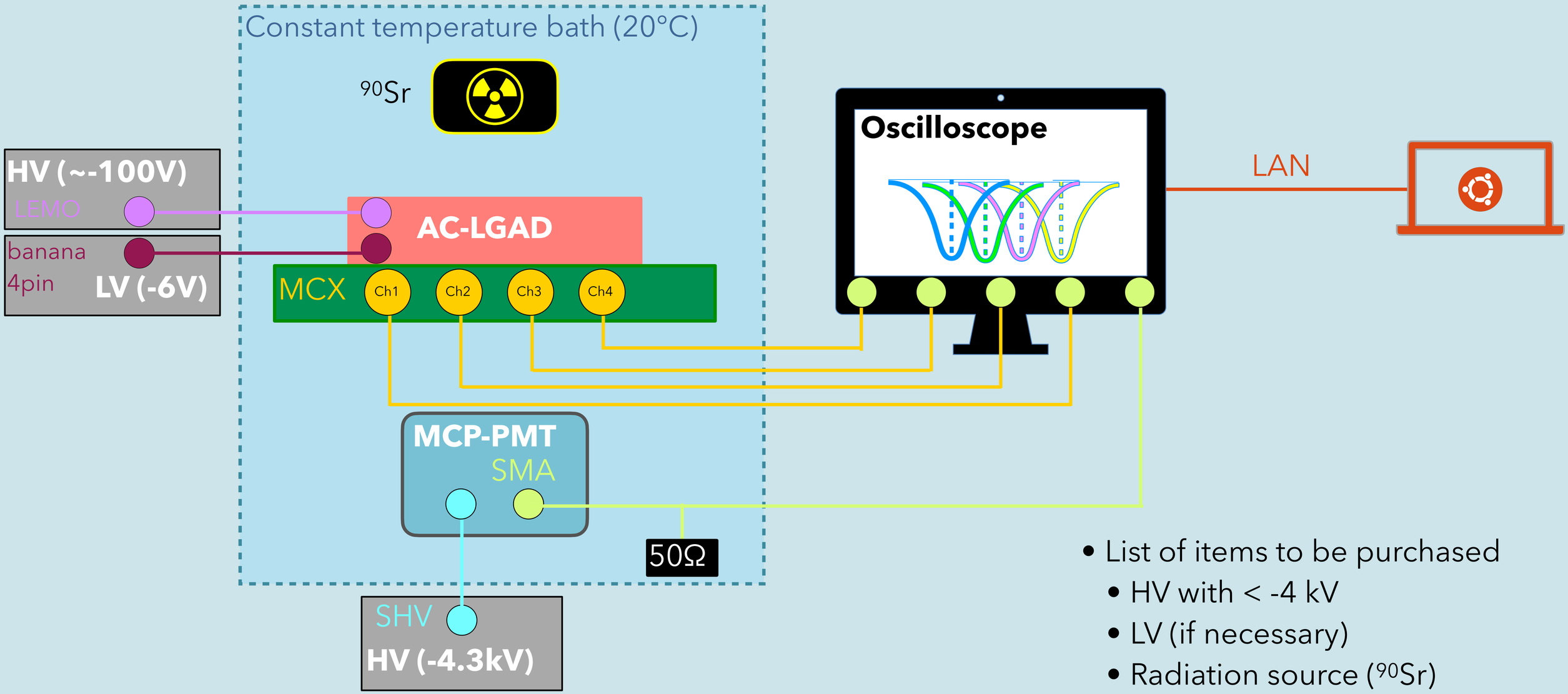


Improve radiation source test with collimators

- If the path length problem can be solved the radiation source method can measure accurate timing resolution easily
- Collimators can restrict beta radiation path length
  - σ_{timing} = 40 ps → 28 ps (analysis in progress)
- The trigger rate with ^{90}Sr (1M Bq), collimator1 and PMT is ~400 Hz, but adding collimator2 is *O*(1) Hz
- Design of the test bench with collimators by using GEANT4 is crucial to speed up the AC-LGAD R&D

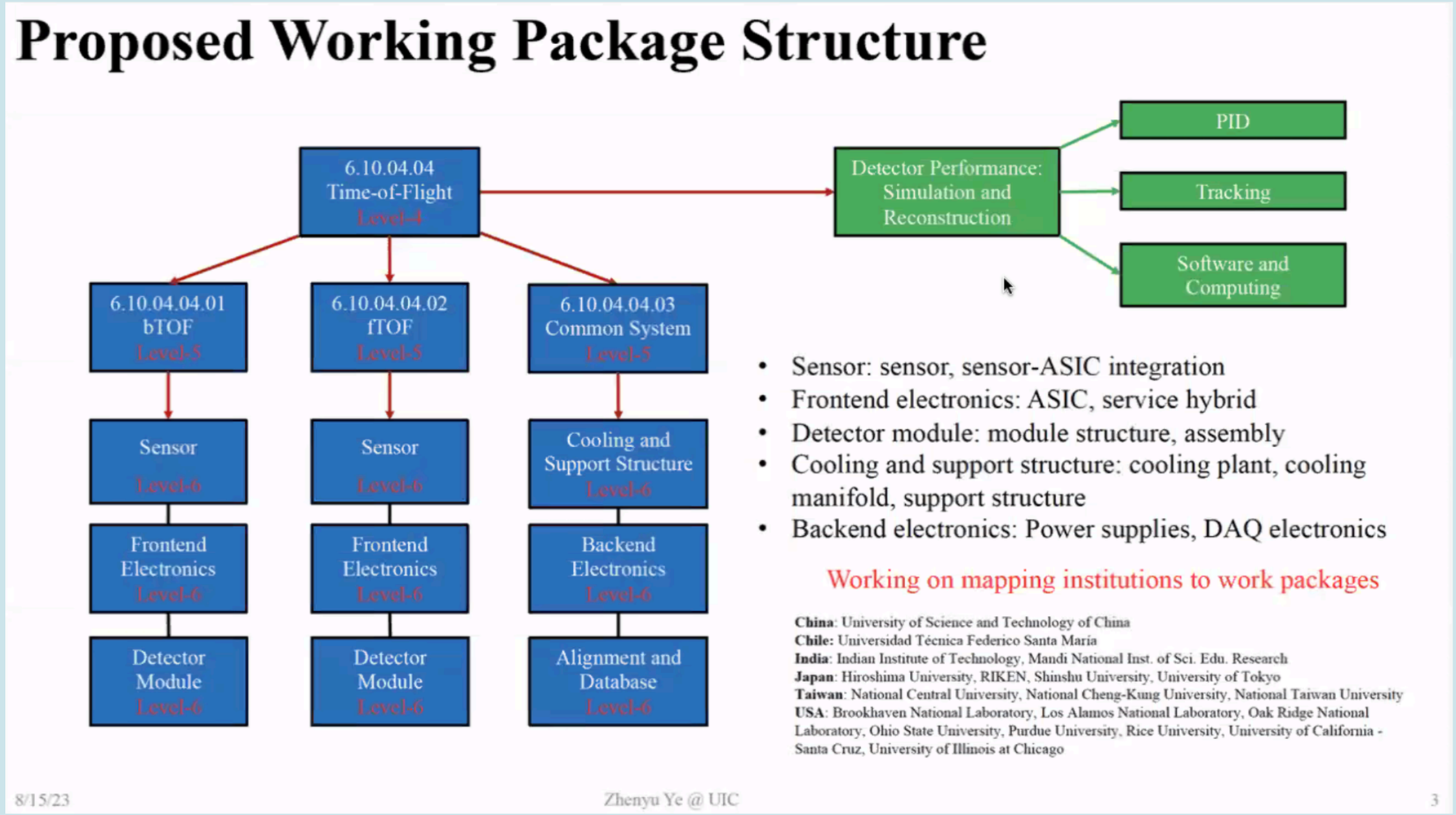






- List of items to be purchased
  - HV with < -4 kV
  - LV (if necessary)
  - Radiation source (^{90}Sr)
  - Connectors
  - Ubuntu PC

News from TOF



- bTOF (Lv.5)
  - Zhenyu Ye
  - Satoshi Yano
  - Mathew Gignac
- fTOF (Lv.5)
  - Mathieu Benoit
  - Wei Li
- Common system (Lv.5)
  - Zhangbu Xu
  - Andreas Jung

Summary

- Three Japanese people participated in the RICUG meeting in 2023 @ Warsaw
  - We discussed how to contribute to the TOF project from the Japanese community

- AC-LGAD R&D exercise campaign with Nakamura has been done
  - We learned how to proceed with the AC-LGAD R&D
  - It became clear what to buy to build the AC-LGAD test bench @ HU
  - (Before getting EICROC, we can use the KEK amplifier board)

- Satoshi Yano is one of the bTOF (Lv.5) leader

- I am staying at BNL to learn how to proceed with the EICROC R&D

Purchase list

- HV for MCPMT: -4300V
- HV (Back bias voltage) for sensor: -190 ~ -110 V
- LV for sensor: 6V

- Oscilloscope has SMA port x 8

- Circuit board of sensor has MCX port x 16
- LV is supplied to bord by 4 pin/banana cable
- HV (BB) is supplied by LEMO cable

- HV is supplied to MCPMT by SHV cable
- Trigger signal from MCPMT is sent by SMA cable (the cable must be split into two ways one is an oscilloscope and the other one has 50Ω resistivity to save oscilloscope)