

# Slab operation at Kyushu and development of one wire function for DIFs

Kyushu University : Kiyotomo Kawagoe, Taikan Suehara

RCAPP : Tamaki Yoshioka

LLR-Ecole polytechnique/CNRS/IN2P3 :

Jean-Claude Brient, Vincent Boudry, Vladislav Balagura, Frederic Magniette, Jerome Nanni, Yannick Geerebaert



Yu Miura (Kyushu University)

Date 19/Feb/2018, ILD ECAL pre -meeting



# Agenda

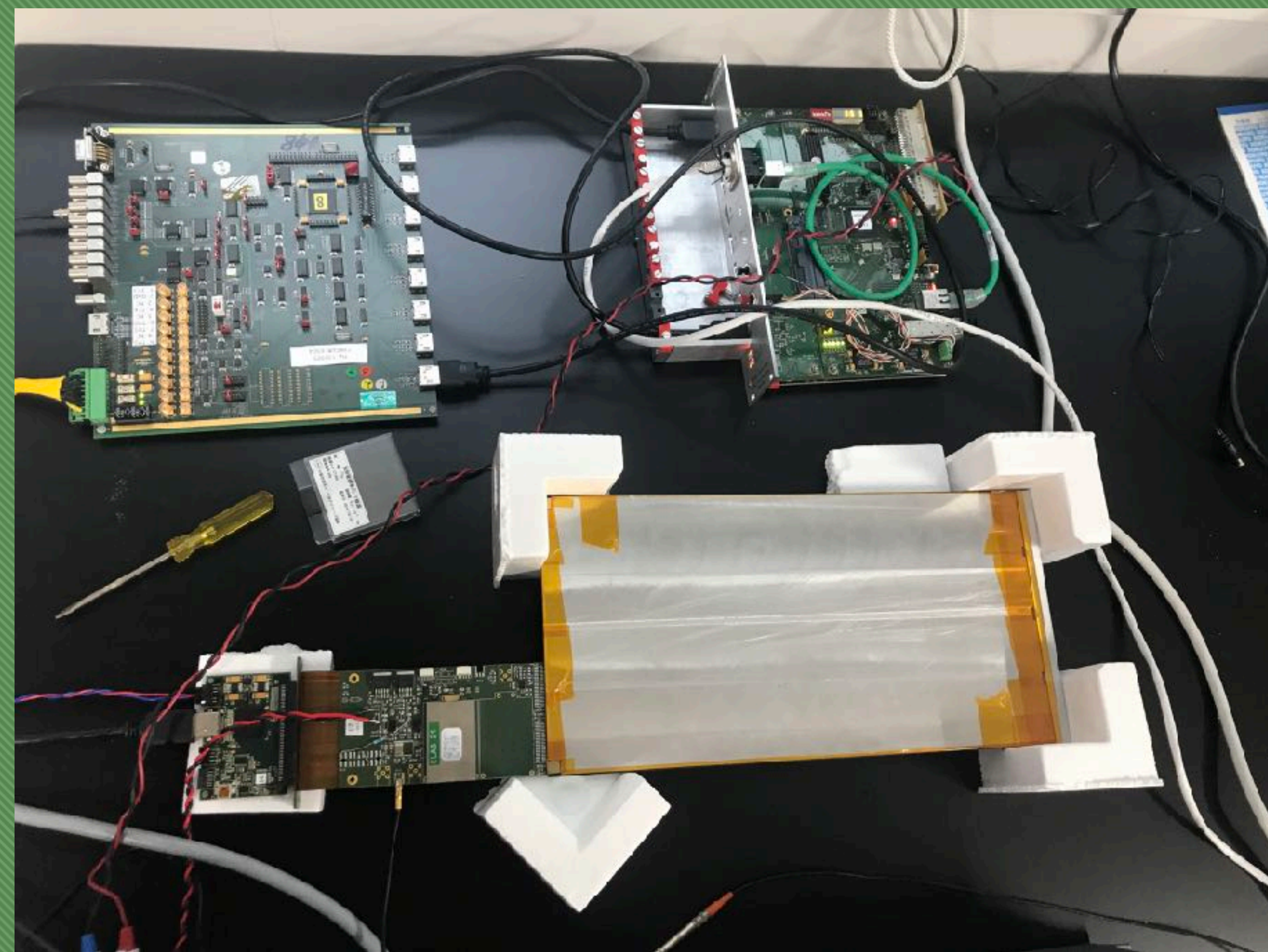
- ✓ Slab operation at Kyushu
- ✓ Development of one wire function for DIFs



- ✓ Slab operation at Kyushu
- ✓ Development of one wire function for DIFs

# Motivation

- ✓ We evaluate SLABs used at DESY more than at test beam(6/2017@DESY)
- ✓ We prepare environment to evaluate performance of new SLABs which will be produced and introduced in Kyushu university next April
- ✓ We want to use the new SLABs for next test beam at DESY

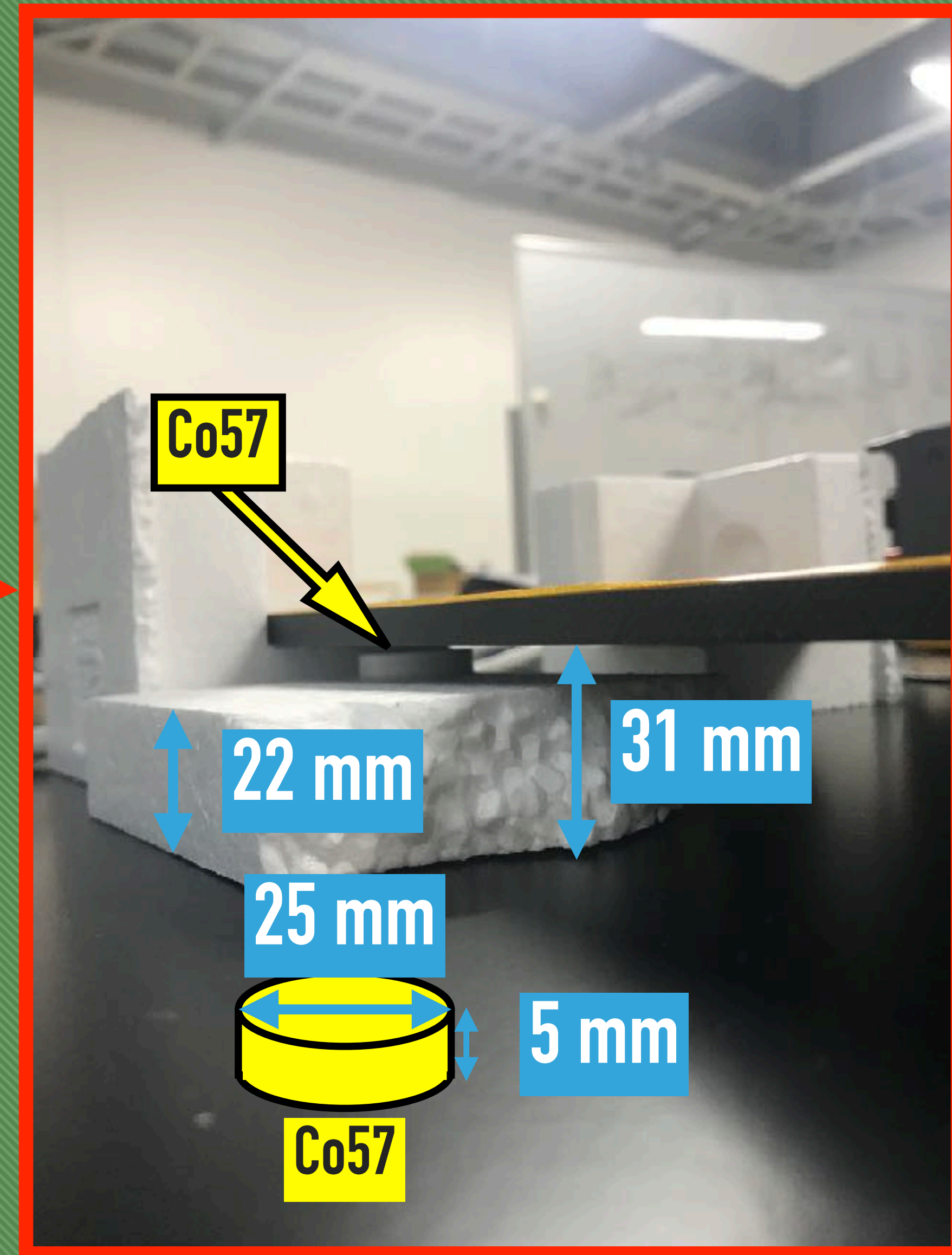
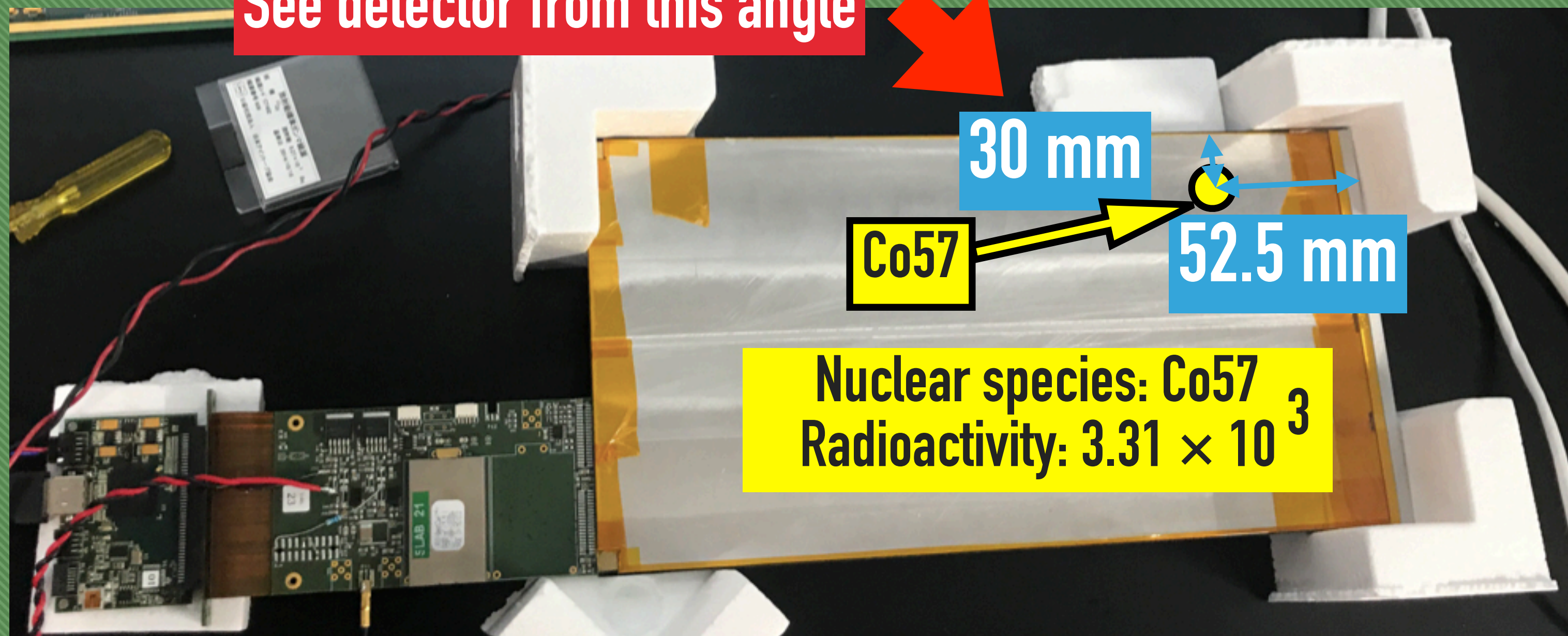


**Setup in Kyushu**

# Setup

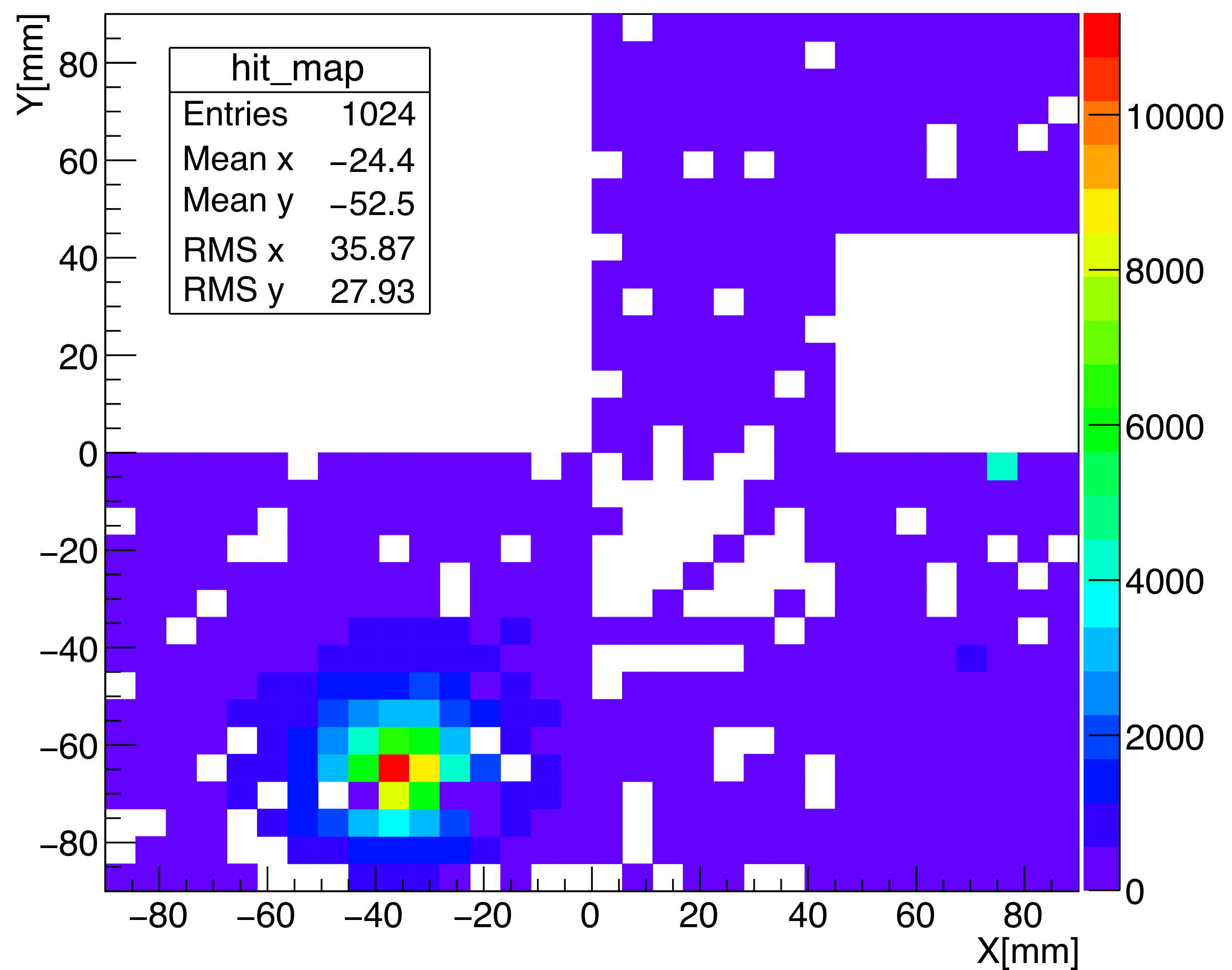
- ✓ Supply 100 V to silicon
- ✓ Co57 radiate gamma radiation of 136 keV (12.2 %) and 122 keV (87.65 %)

See detector from this angle



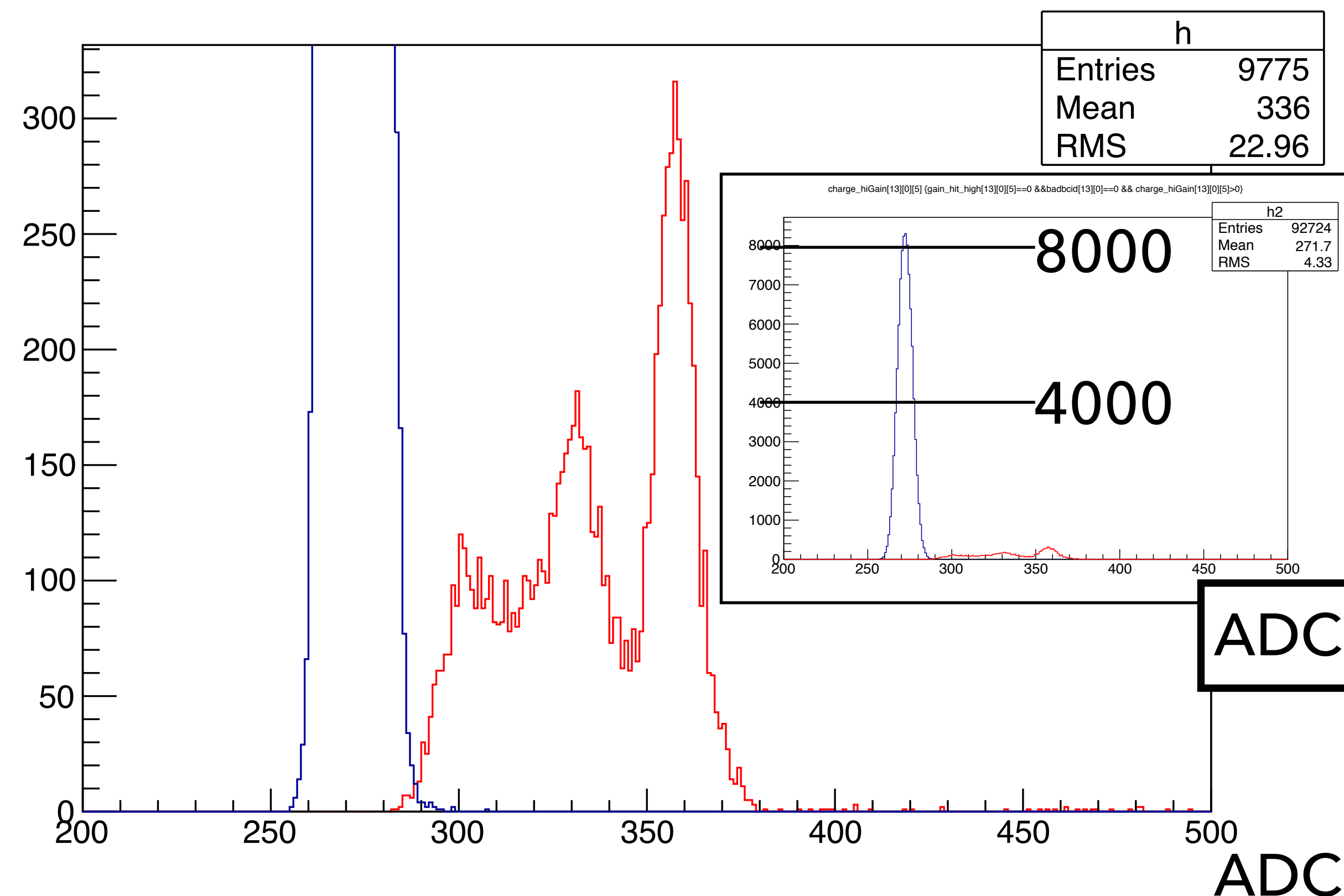
# Result

### hit\_map



### charge\_hiGain[13][0][5]

charge\_hiGain[13][0][5] {gain\_hit\_high[13][0][5]==1 &&badbcid[13][0]==0 && charge\_hiGain[13][0][5]>0}



✓ This position of histogram is red point of hit map.

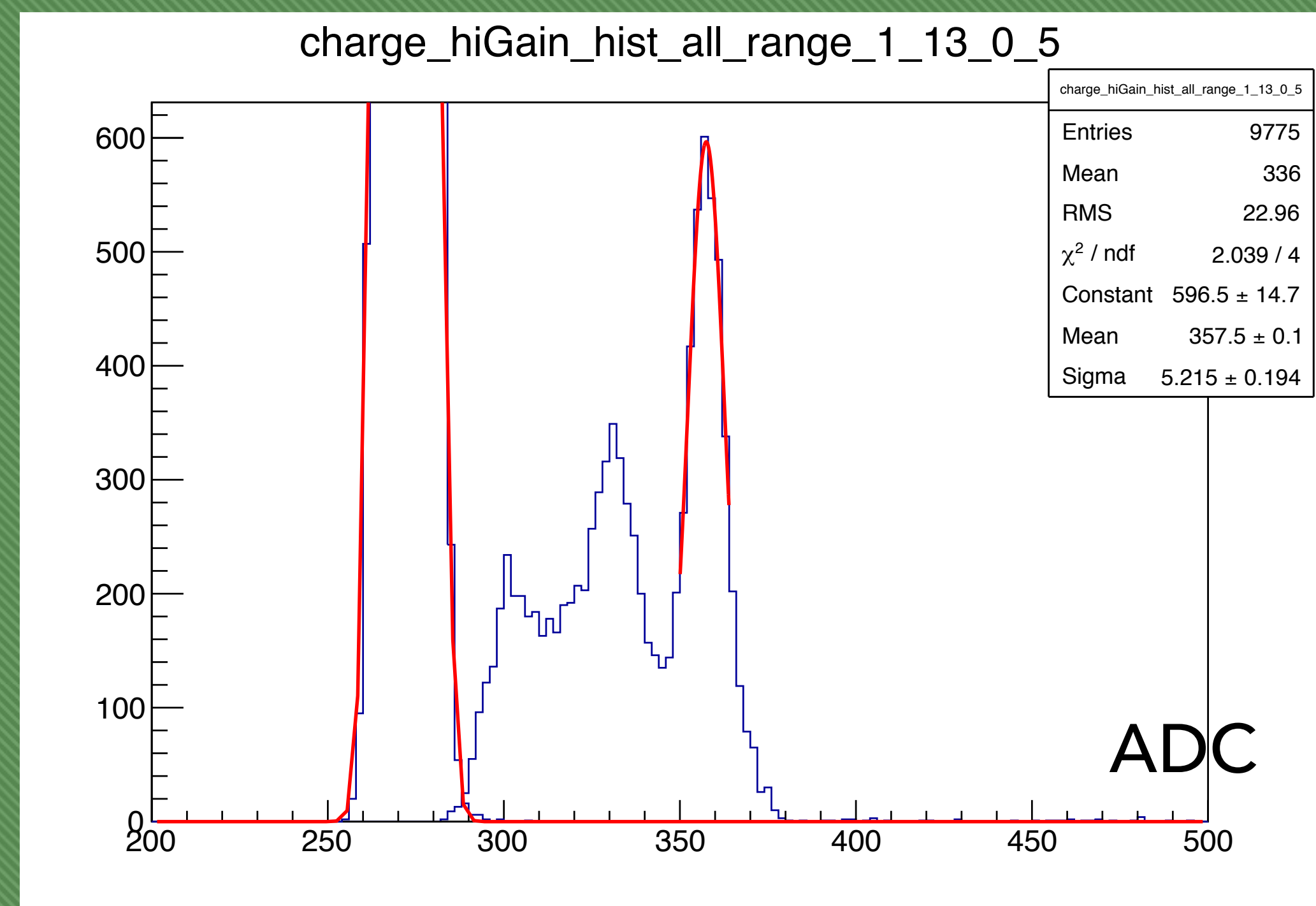
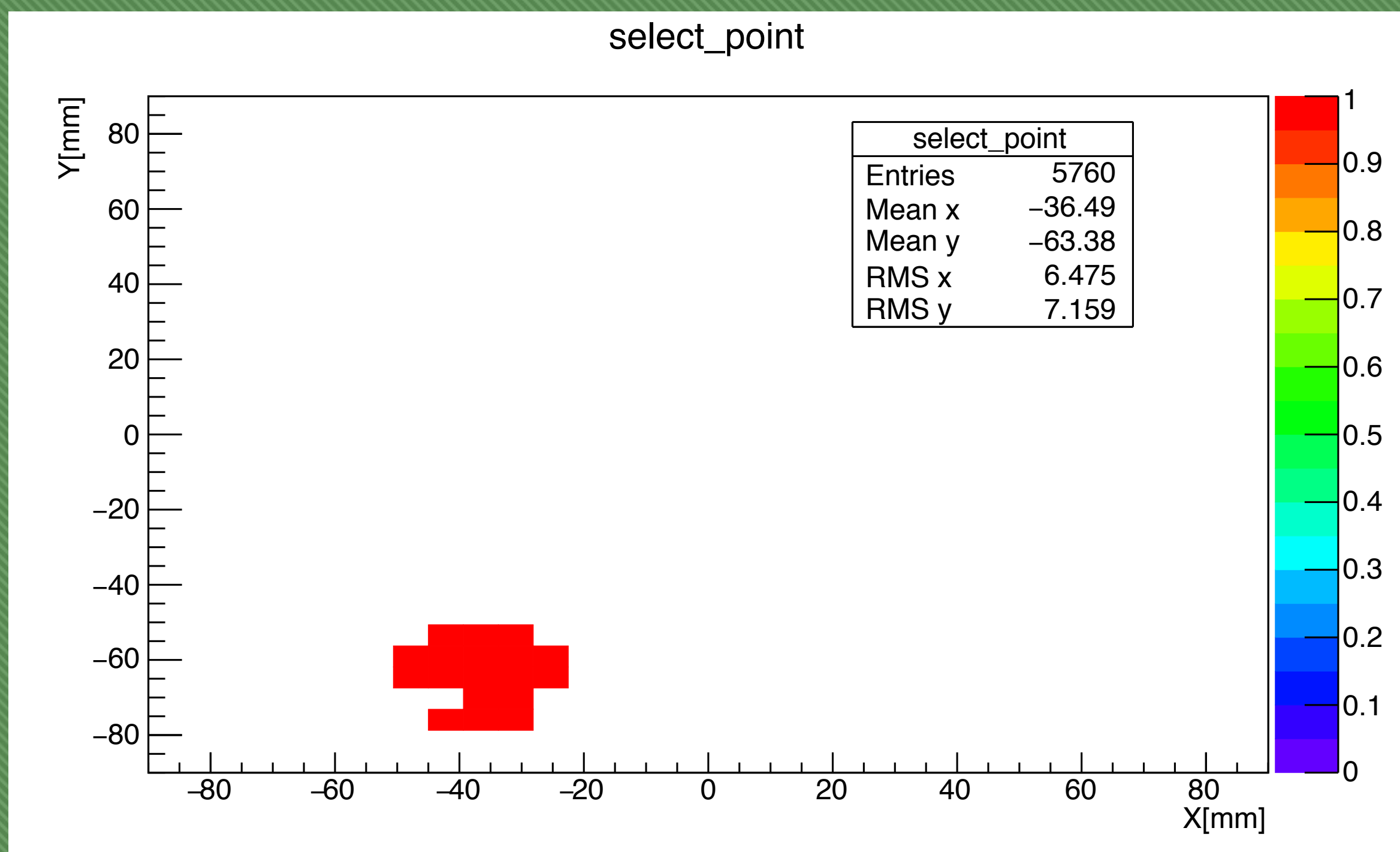
# Analysis

## ✓ Data selection

✓ Select SCAs with more than 2000 hits

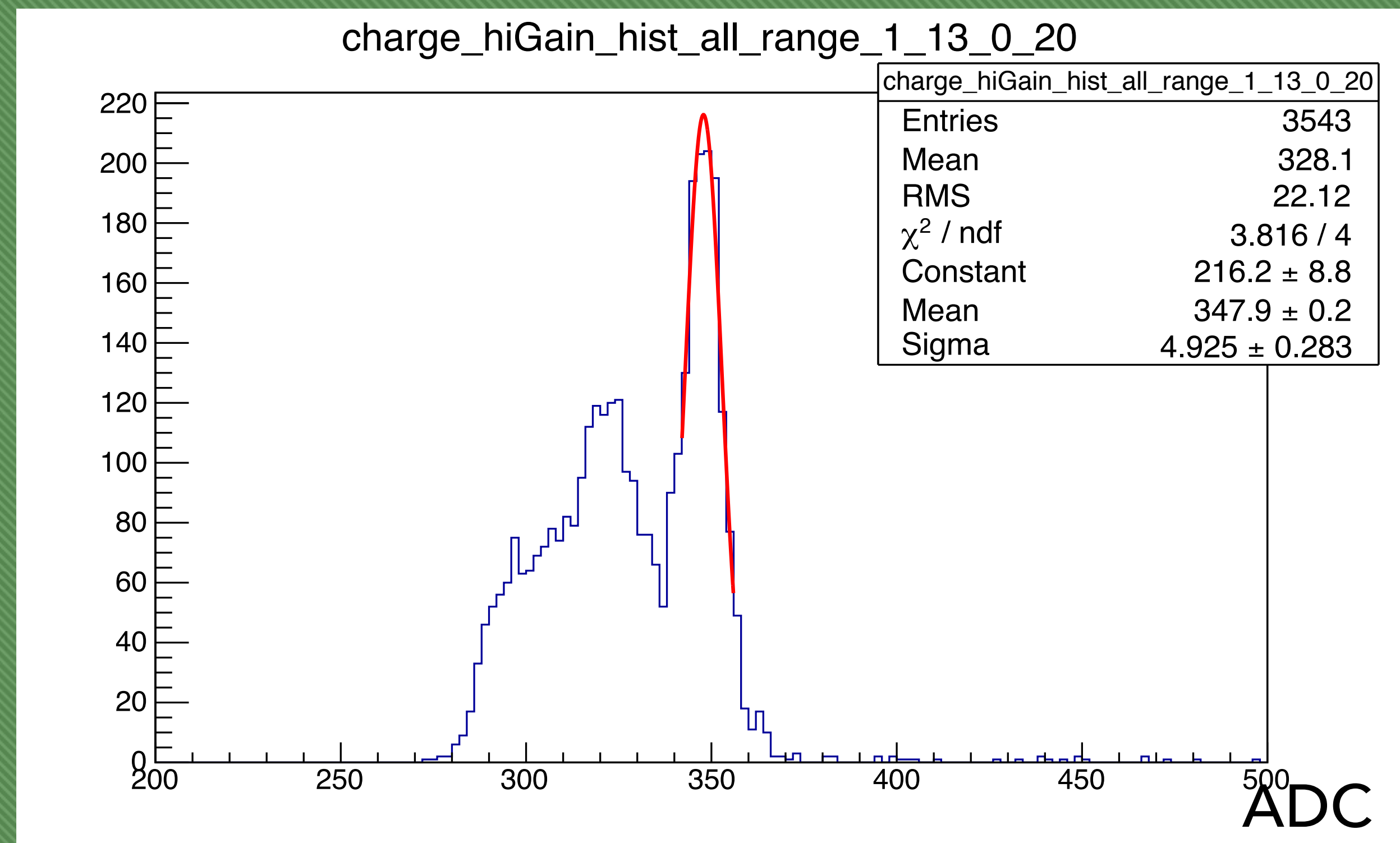
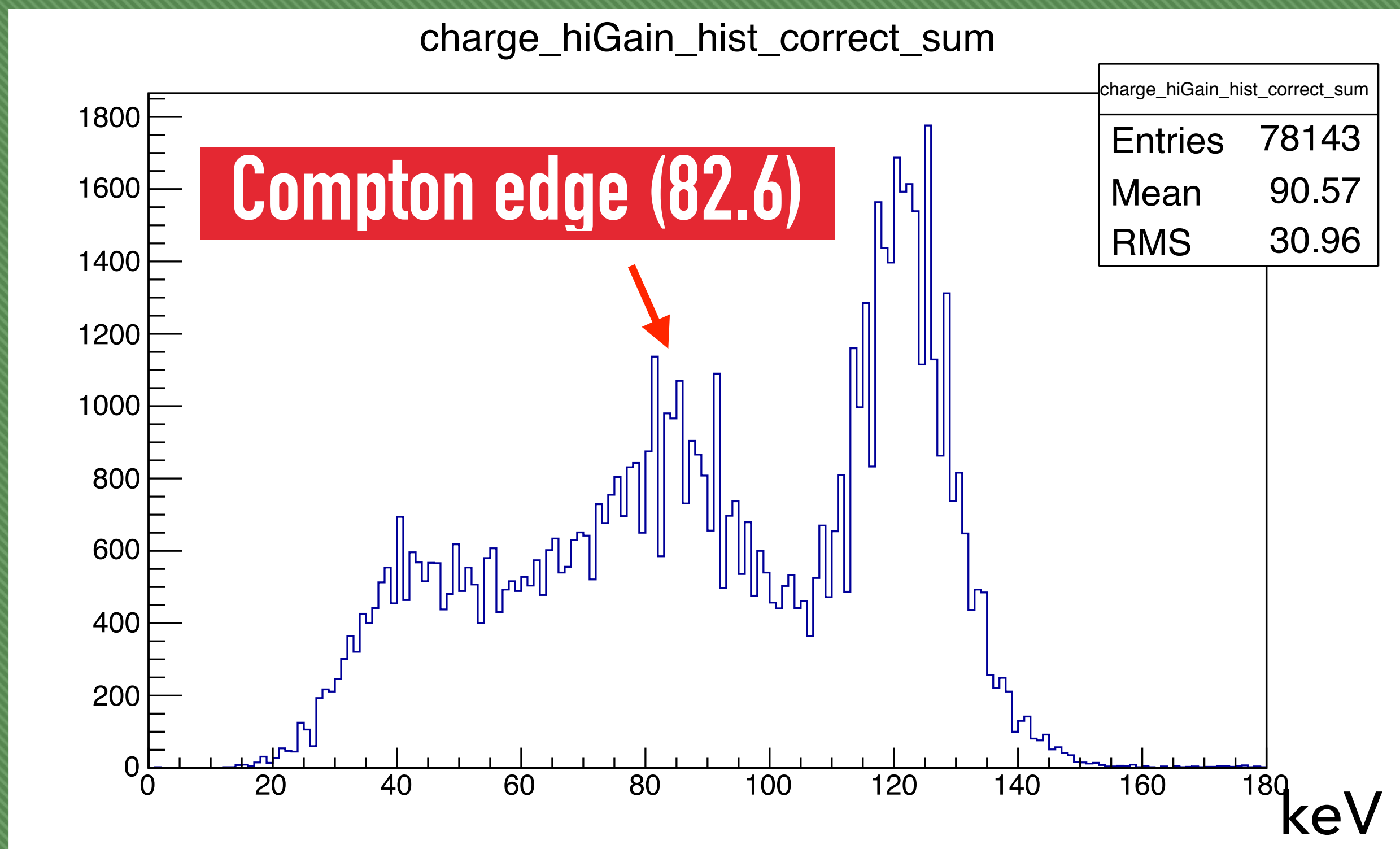
## ✓ Position of pedestal and peak of 122 keV

✓ We used fitted mean of Gaussian for calibration



# Analysis

- ✓ We can see Compton edge, but can't see peak of 136 keV
- ✓ There is histogram which is seen like peak of 136 keV
- ✓ Calibration is not good





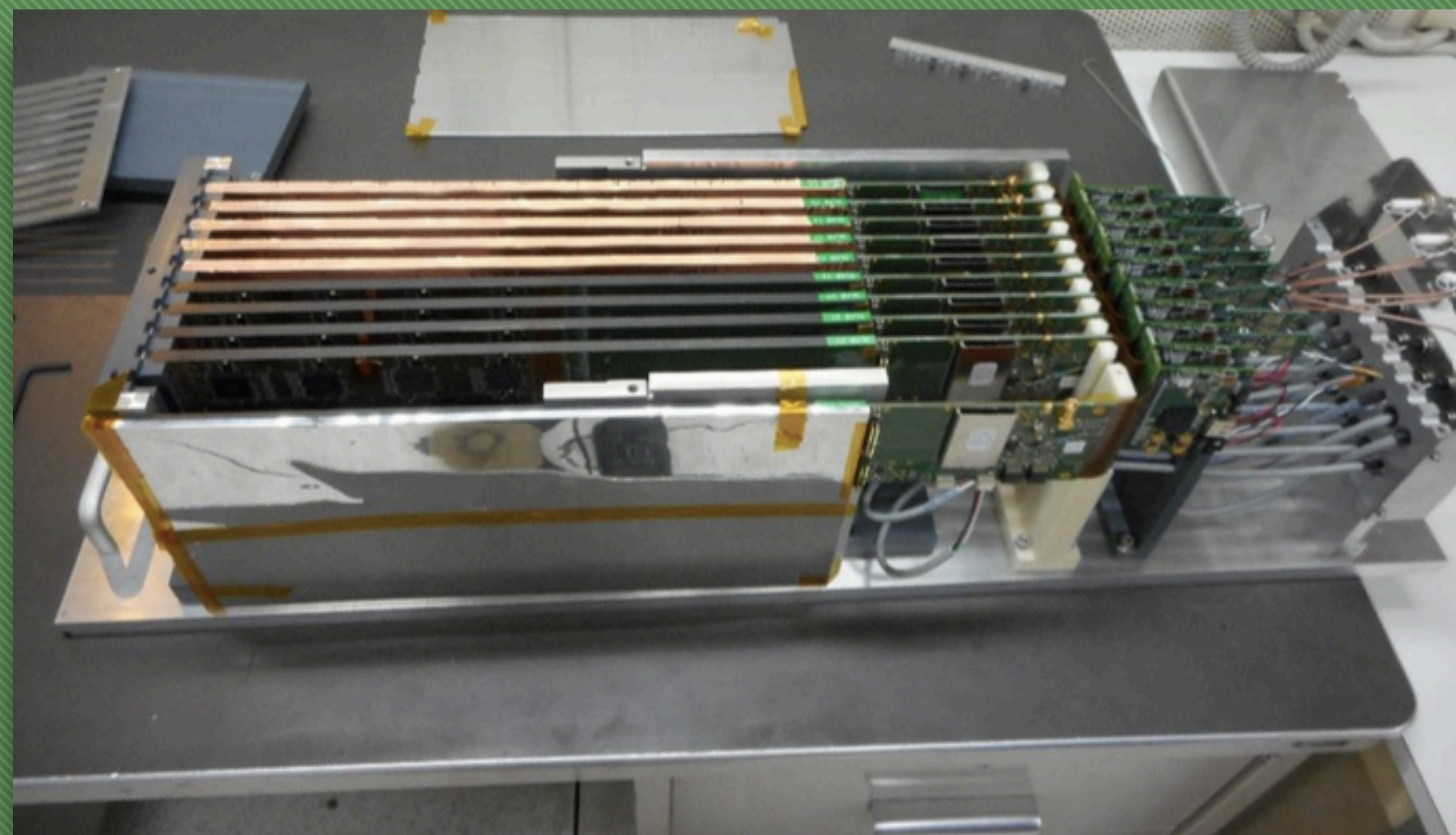
# Agenda

- ✓ Slab operation at Kyushu
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# Motivation

## ✓ Motivation

- ✓ In the future, a lot of detectors will be produced and installed in ILD
- ✓ Detect mis-order of detectors caused by mistakes of connection etc...  
—> Introducing unique ID
- ✓ Confirm condition of devices
  - ✓ Rise in temperature on SLABs  
—>Monitoring temperature of substrate



**June/2017 @DESY**

- ✓ We use DS2438 to introduce unique ID and monitor temperature of substrate.
- ✓ DS2438 requires only one port pin for communication
- ✓ DS2438 have 64 bits of unique ID and sensor which can measure temperature
- ✓ Operating range is  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$

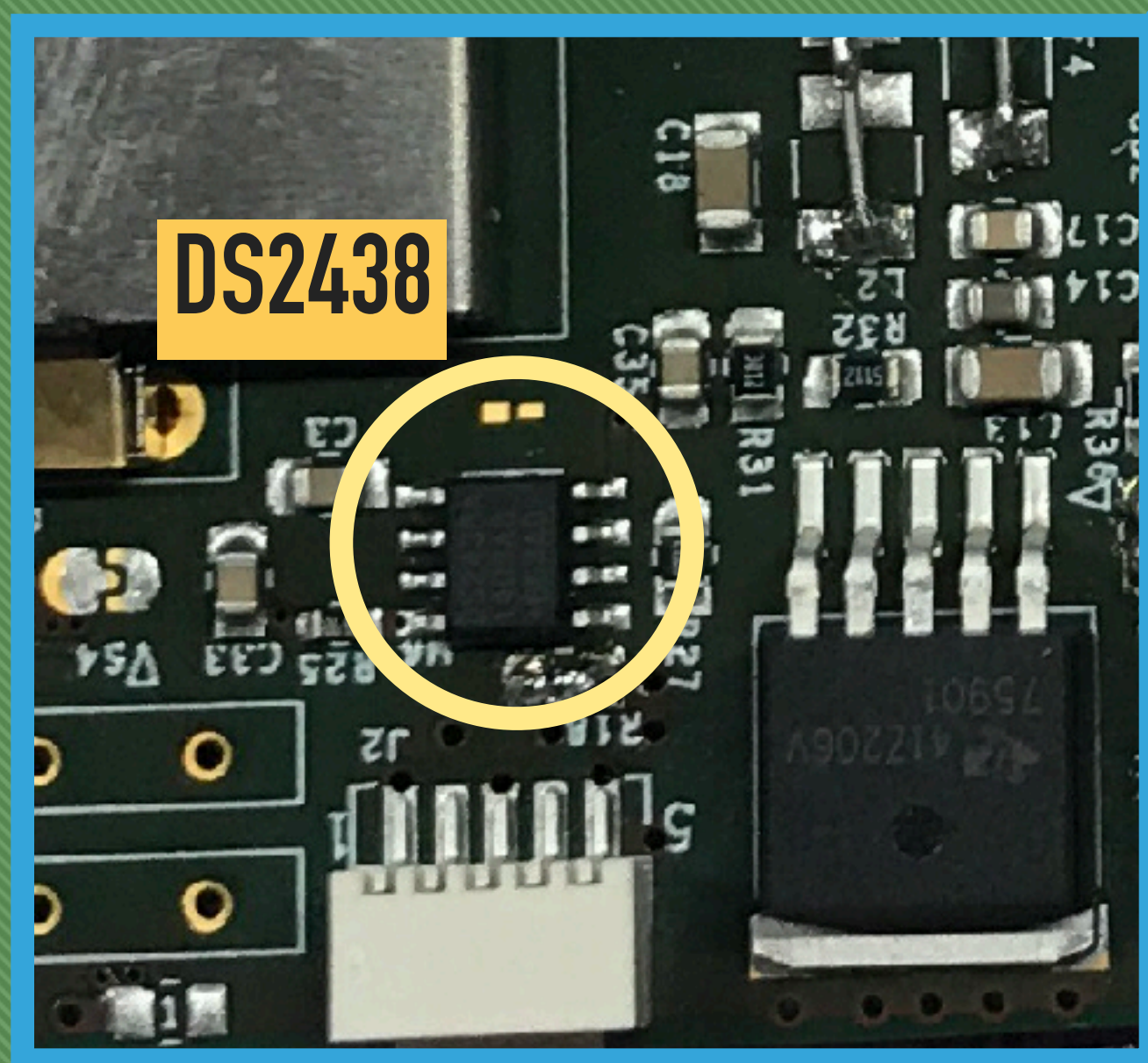
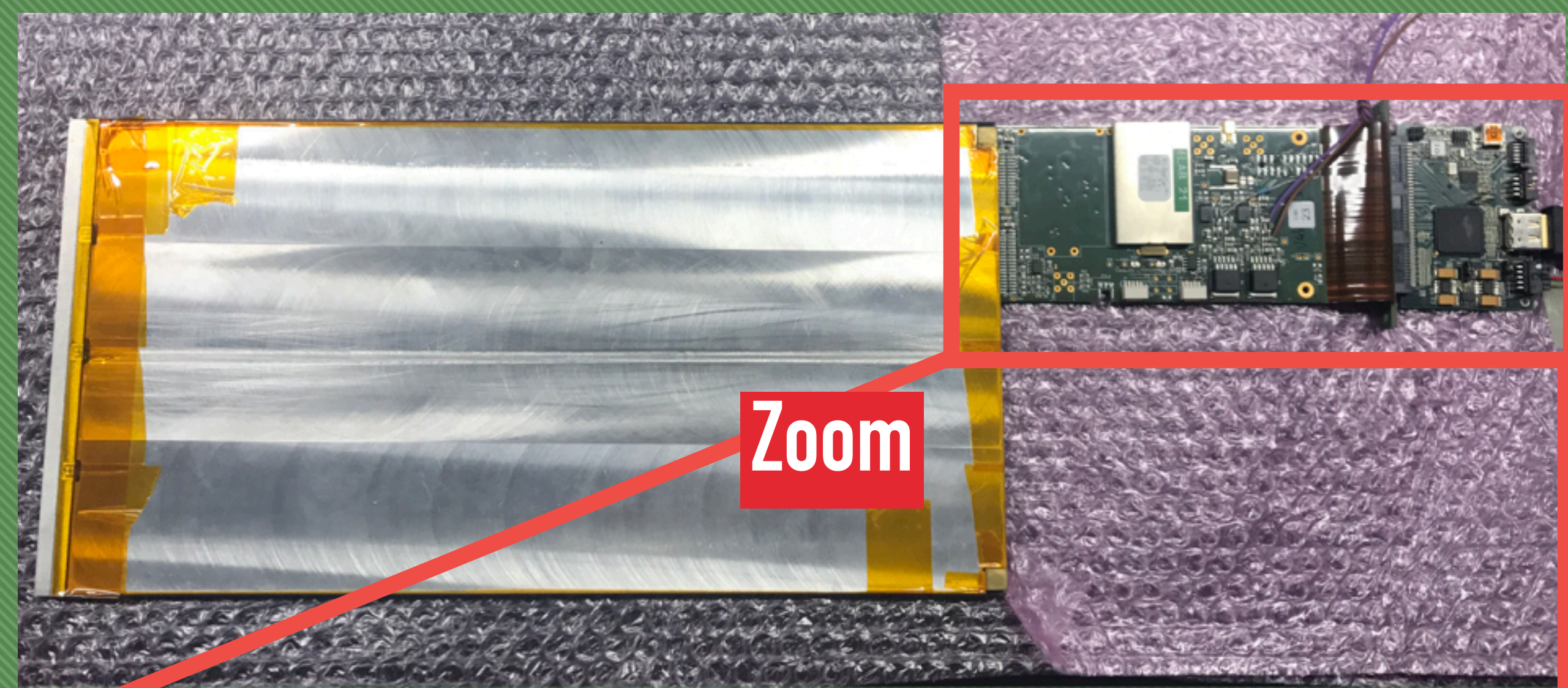
Picture of DS2438



# Mount DS2438 on the SLAB

Detector TB@DESY June/2017

- ✓ DS2438 have mounted on the SLAB
- ✓ Rewrite the FPGA for using DS2438



Zoom

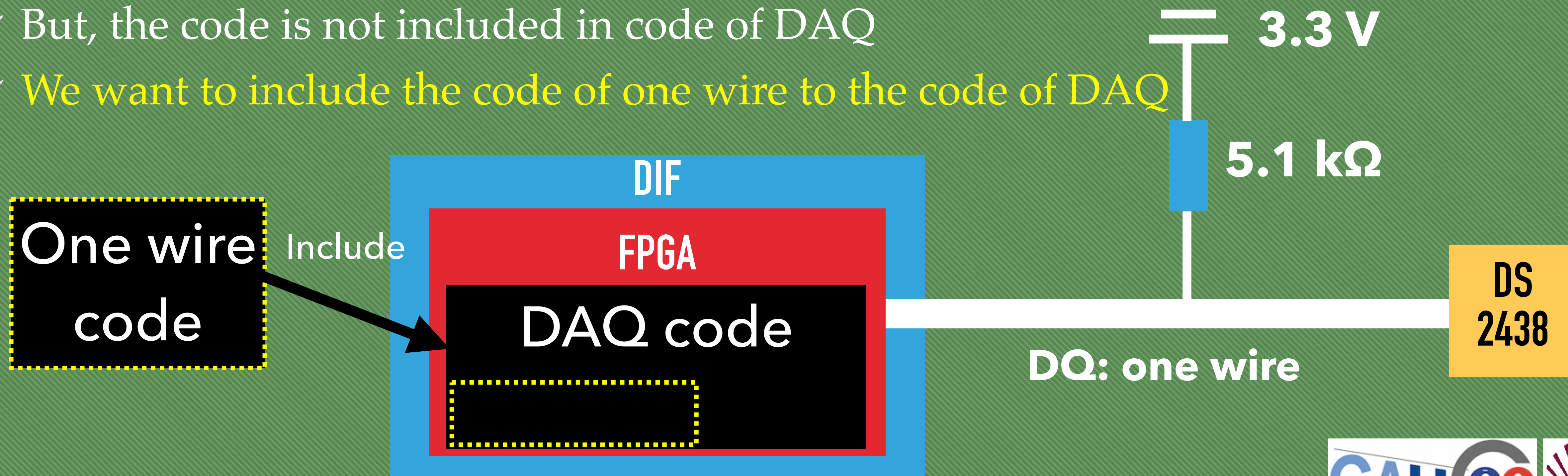


FPGA

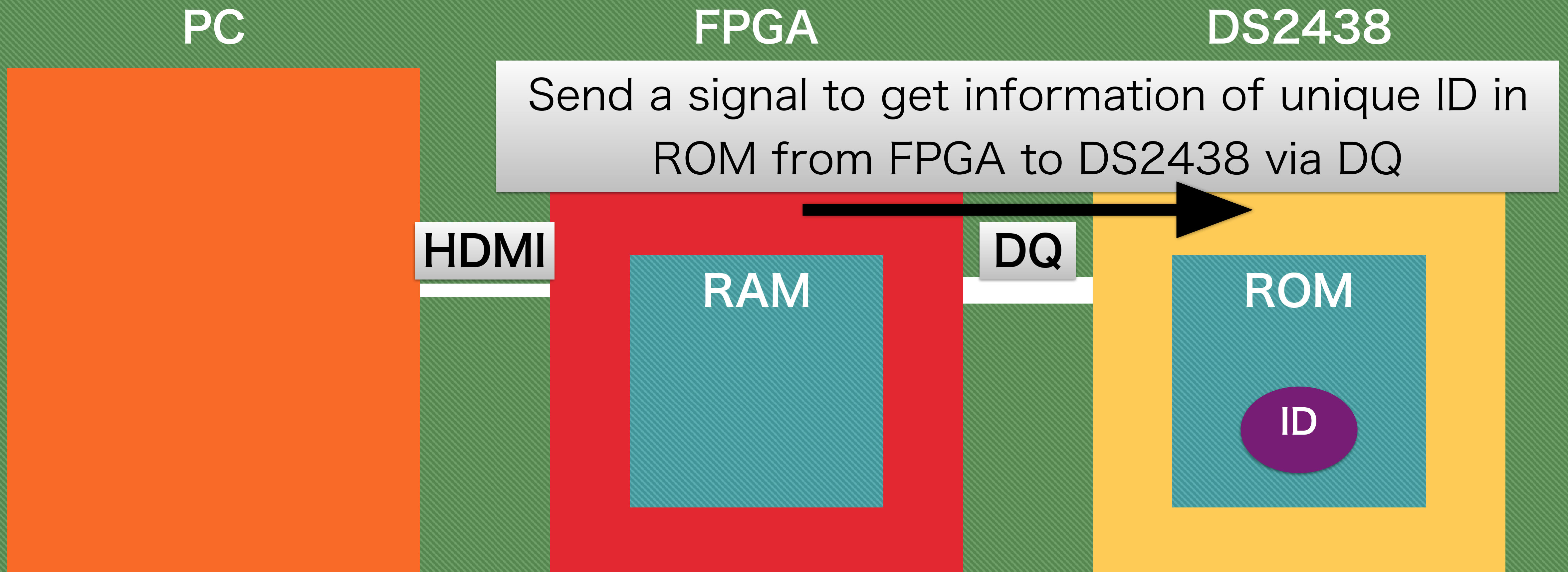


# Development of one wire for DIFs

- ✓ We use one wire to communicate DS2438
- ✓ One wire requires serial communication
- ✓ Advantage of one wire is that it requires less space
- ✓ Disadvantage of one wire is that communication speed is slow
- ✓ Now, we have code of reading measured temperature and unique ID
- ✓ But, the code is not included in code of DAQ
- ✓ **We want to include the code of one wire to the code of DAQ**

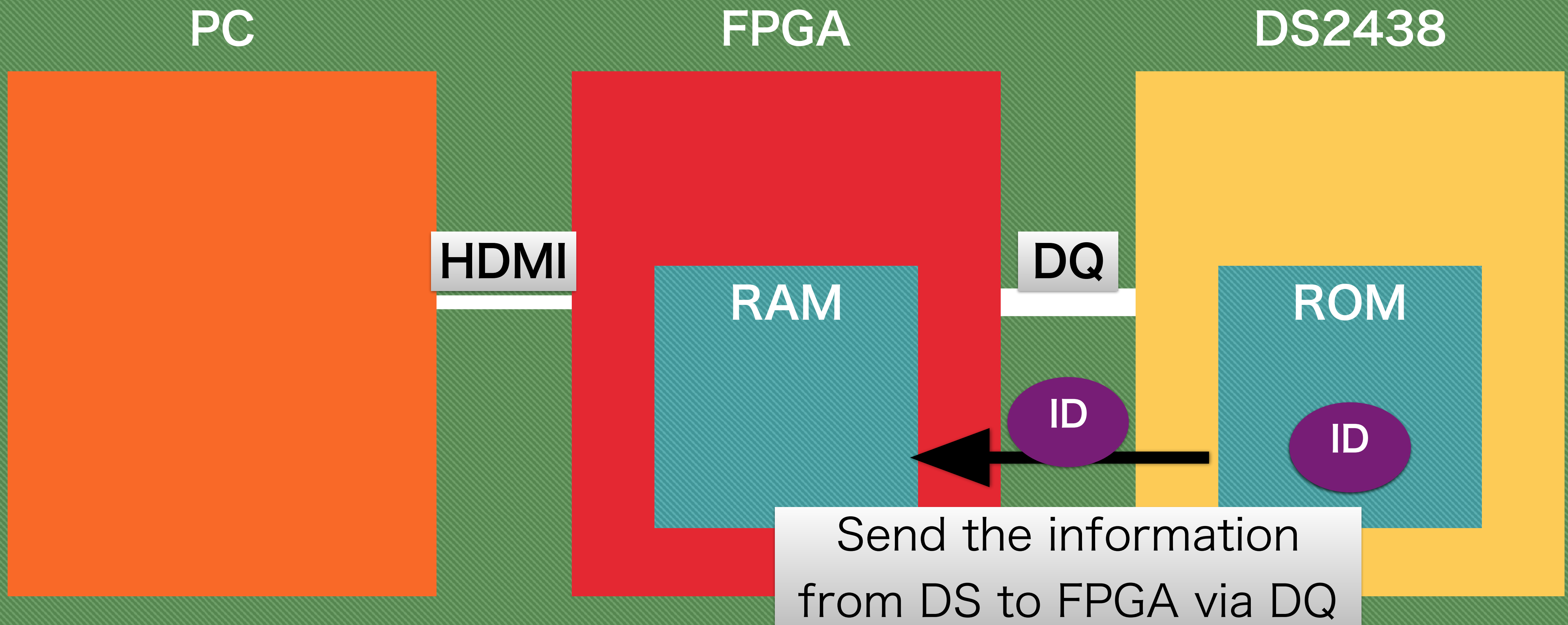


# Protocol of reading unique ID during starting SMB and DIF ①



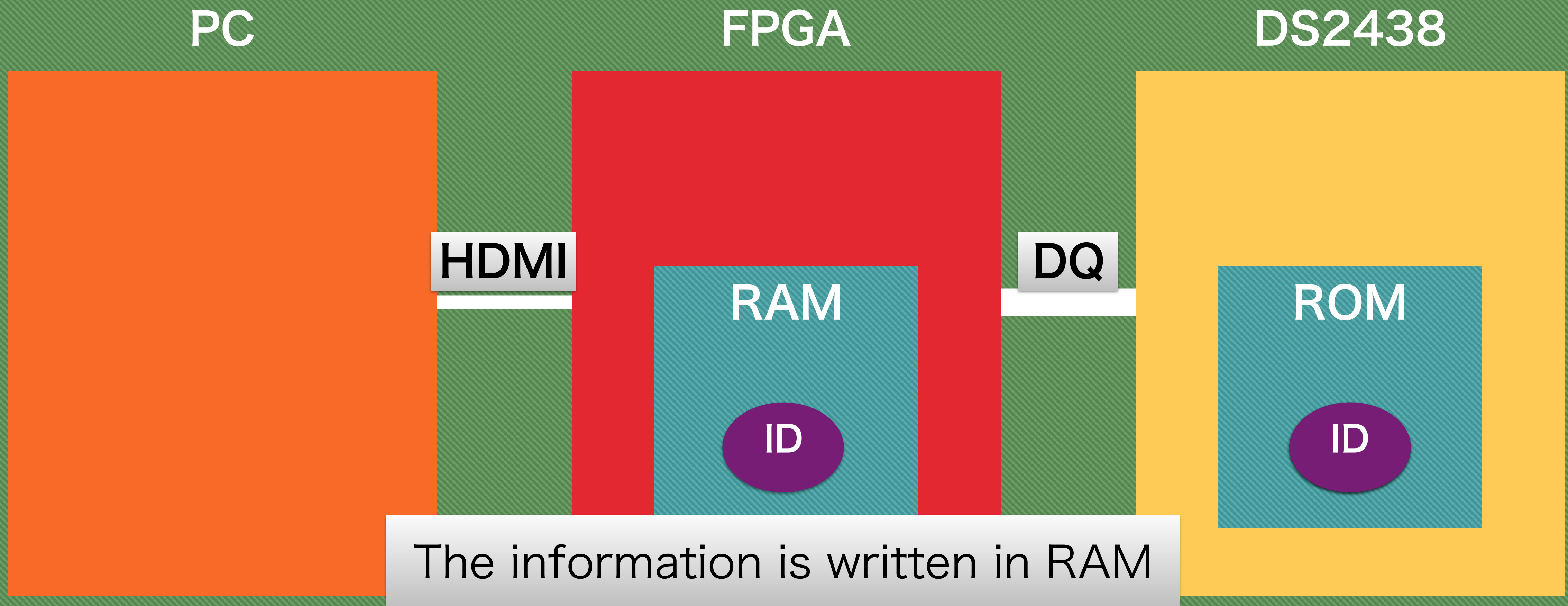
This object "ID" is information of unique ID

# Protocol of reading unique ID during starting SMB and DIF ②



**ID** This object "ID" is information of unique ID

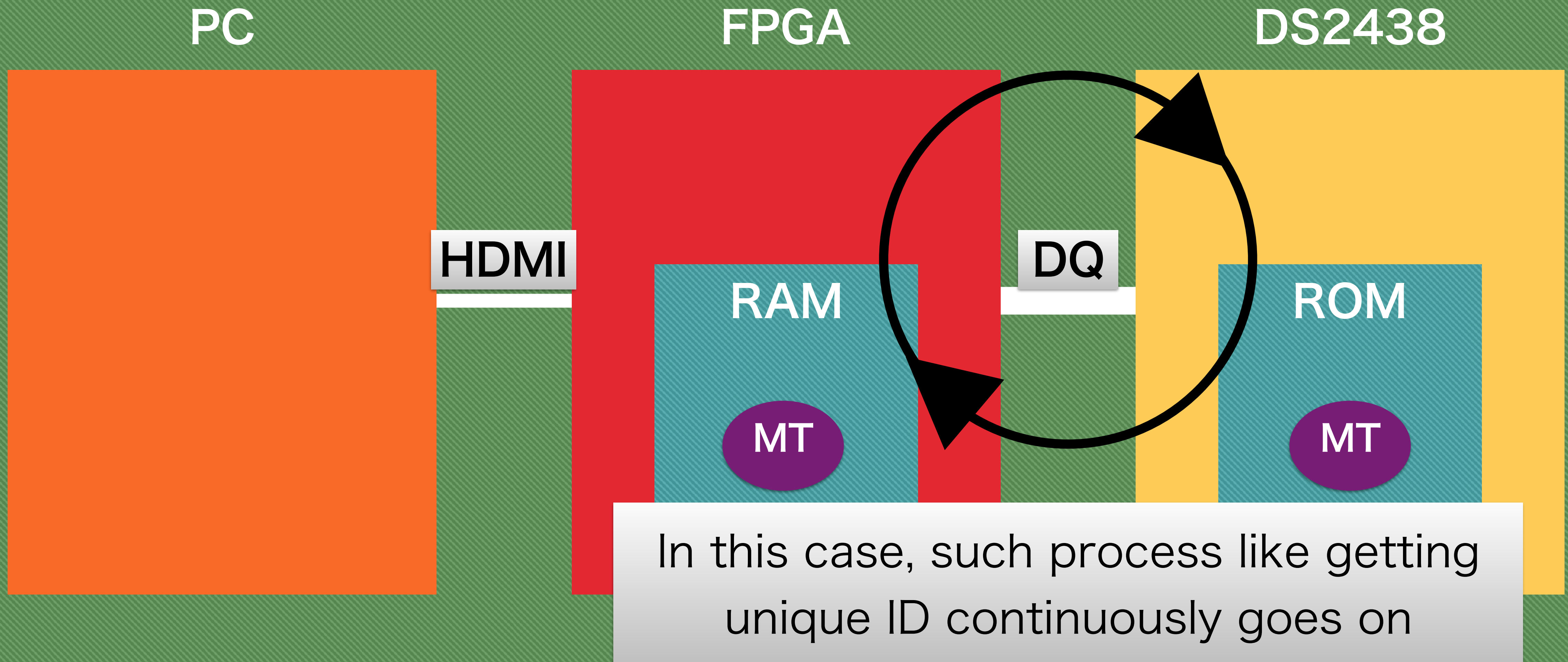
# Protocol of reading unique ID during starting SMB and DIF ③



This object "ID" is information of unique ID

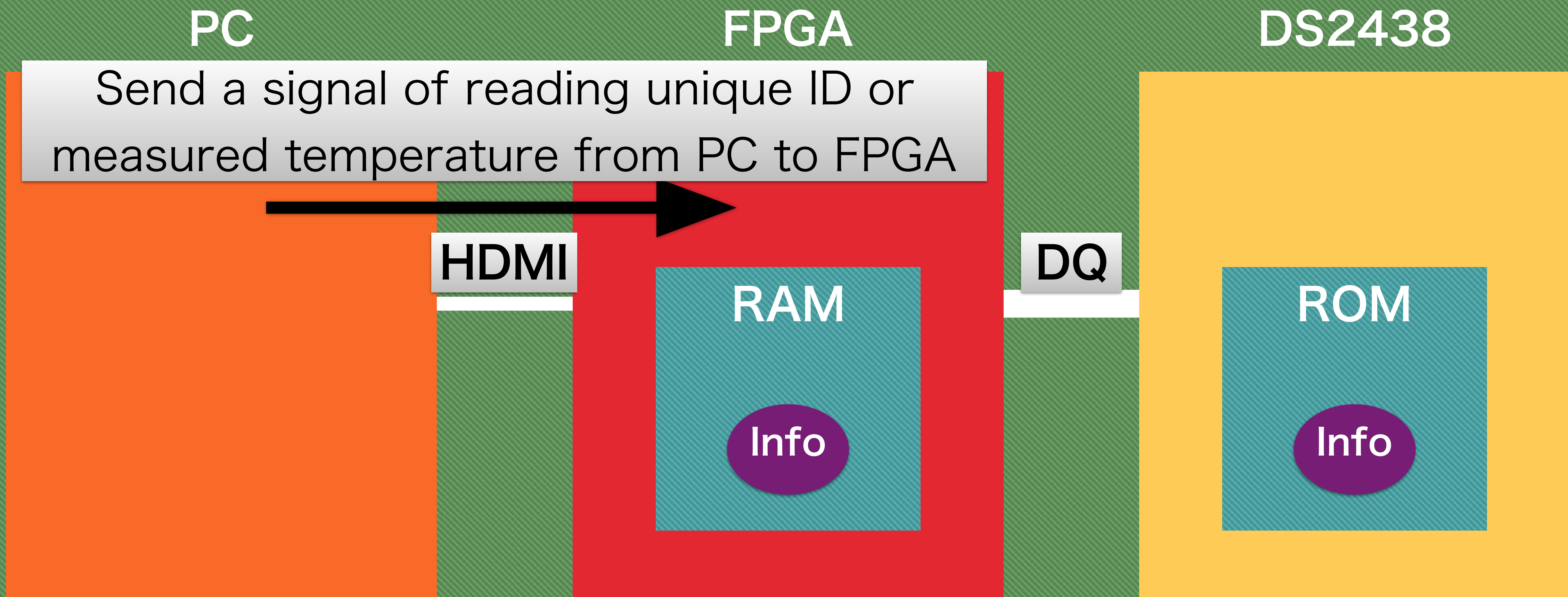


# Protocol of reading measured temperature during starting SMB and DIF



This object "MT" is information of measured temperature

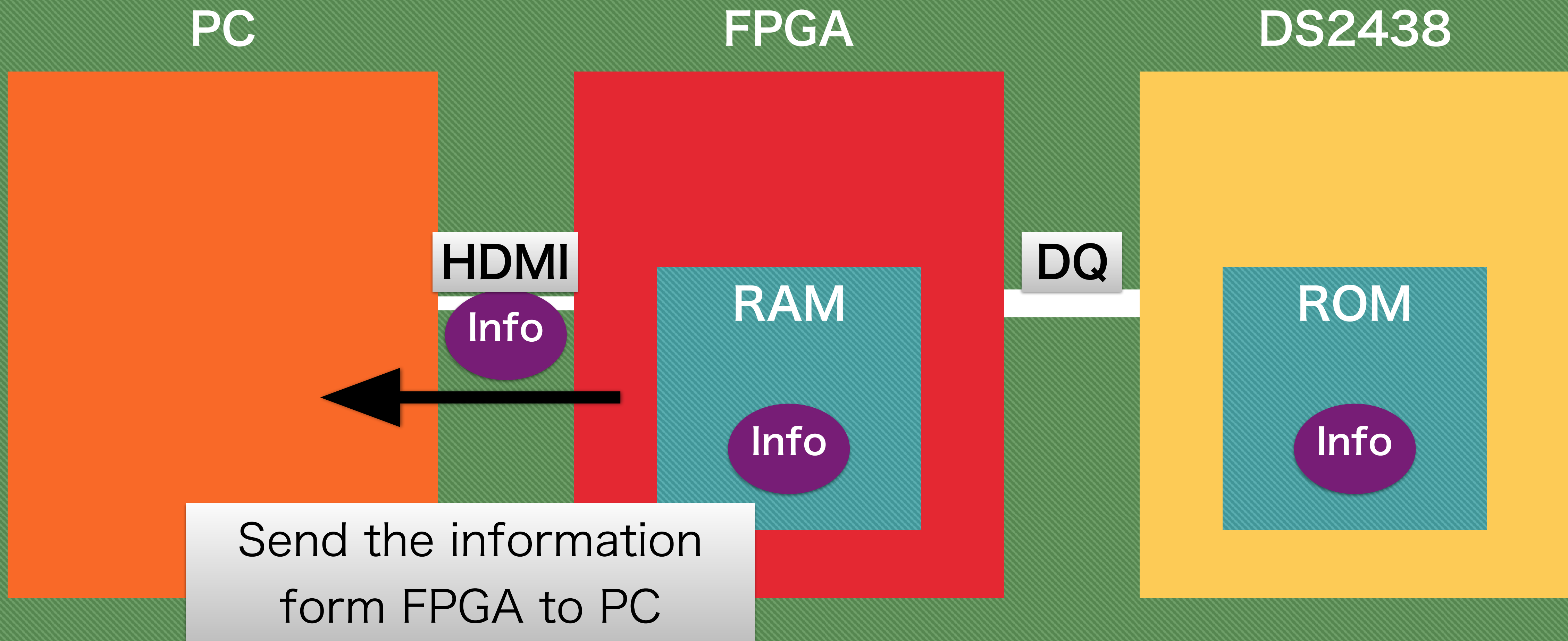
# Protocol of reading unique ID and measured temperature ①



**Info**

This object "Info" is information of unique ID and measured temperature

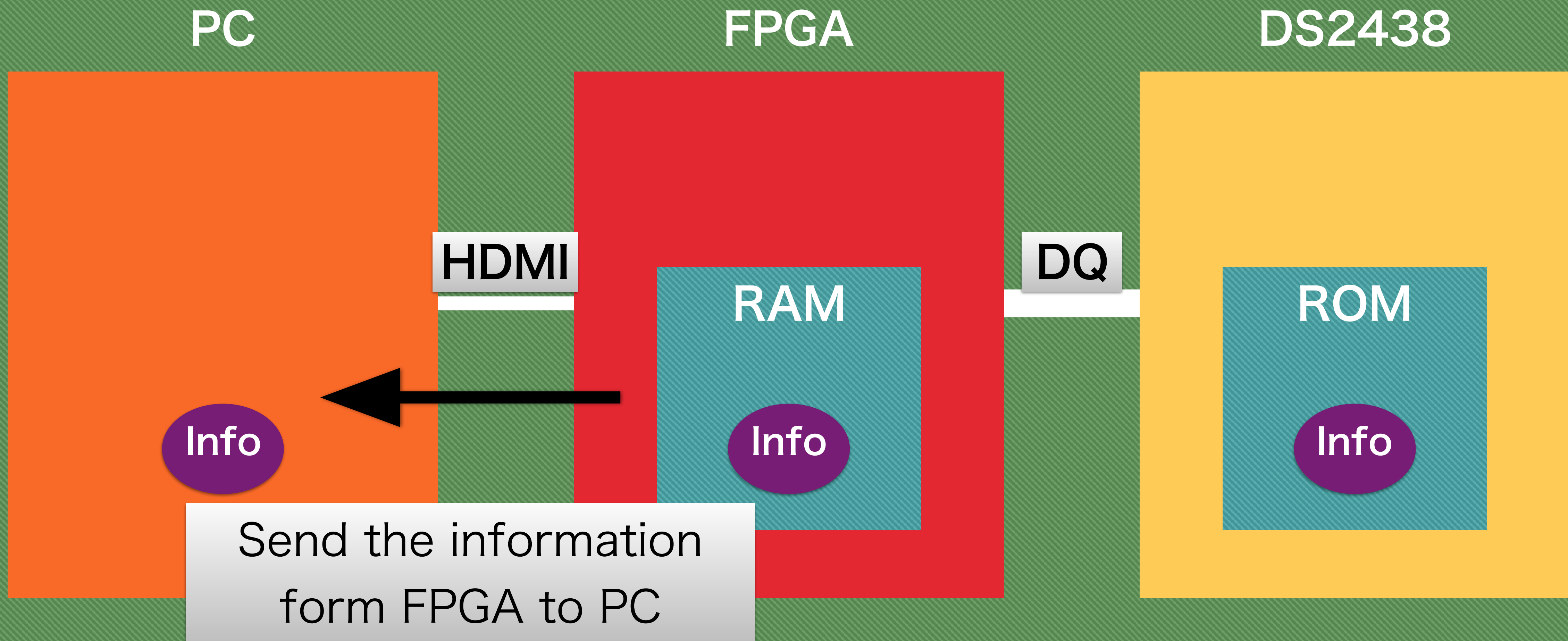
# Protocol of reading unique ID and measured temperature ②



**Info** This object "Info" is information of unique ID and measured temperature



# Protocol of reading unique ID and measured temperature ②



**Info** This object "Info" is information of unique ID and measured temperature



# Current condition

- ✓ We could prepare for environment to study about development of one wire function for DIFs
- ✓ We can get unique ID on the simulation



Setup PC

## ✓ Slab operation

- ✓ We could operate SLAB and acquire data of Co57
- ✓ We can't get peak of 136 keV because we think calibration is not good

## ✓ Development of one wire for DIFs

- ✓ We are introducing into unique ID and system of measuring temperature
- ✓ We think that study of one wire will be finished until next JPS (22/Mar/2018)