

GLD-MUON R/D

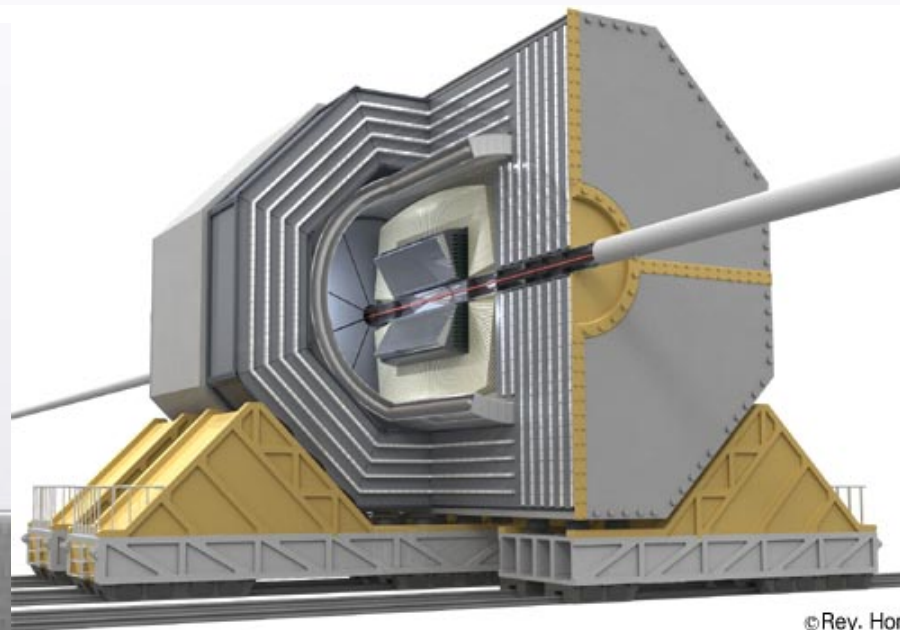
T.Takeshita for GLD @Snowmass 05

GLD-MUON system

R/D results

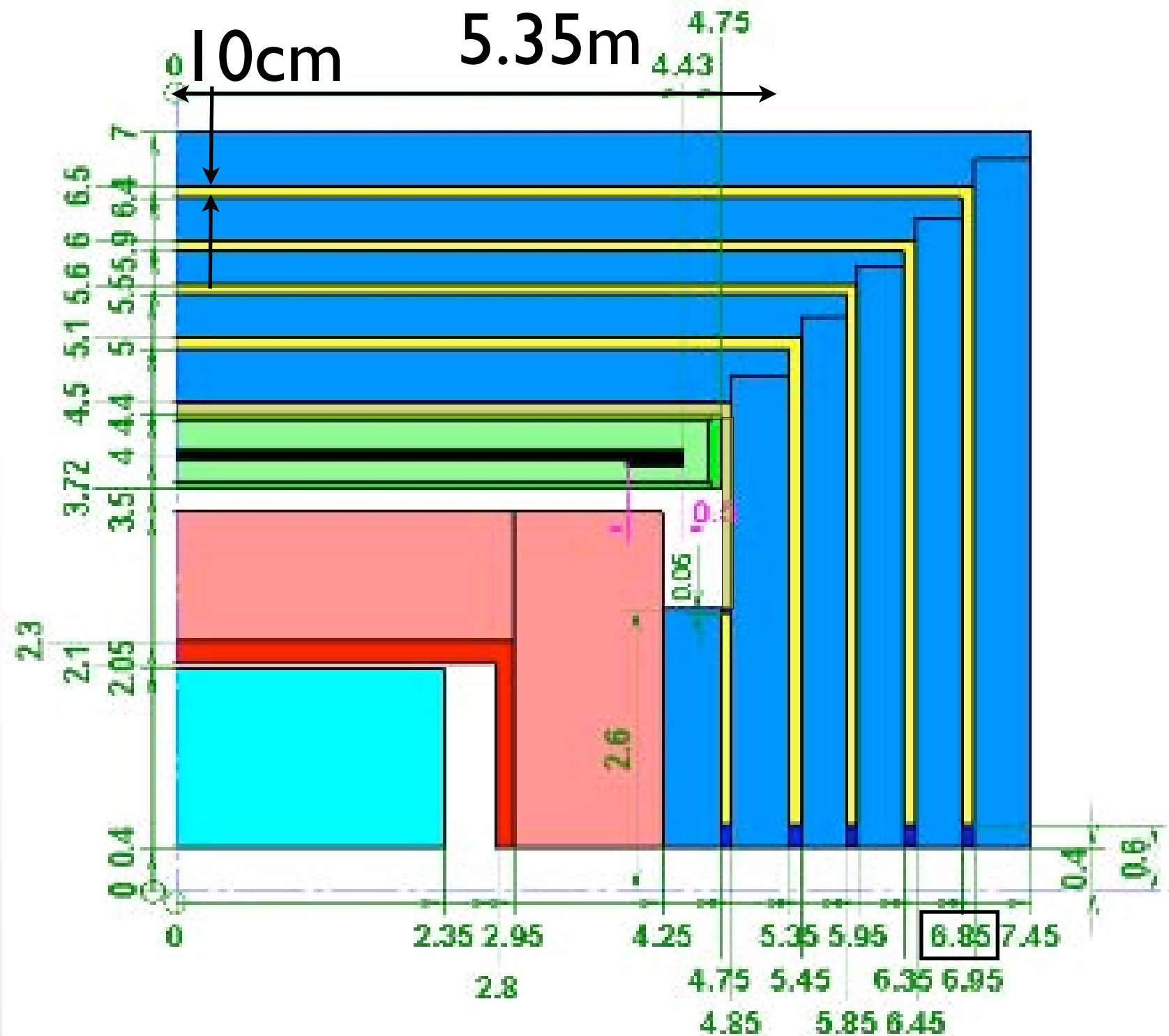
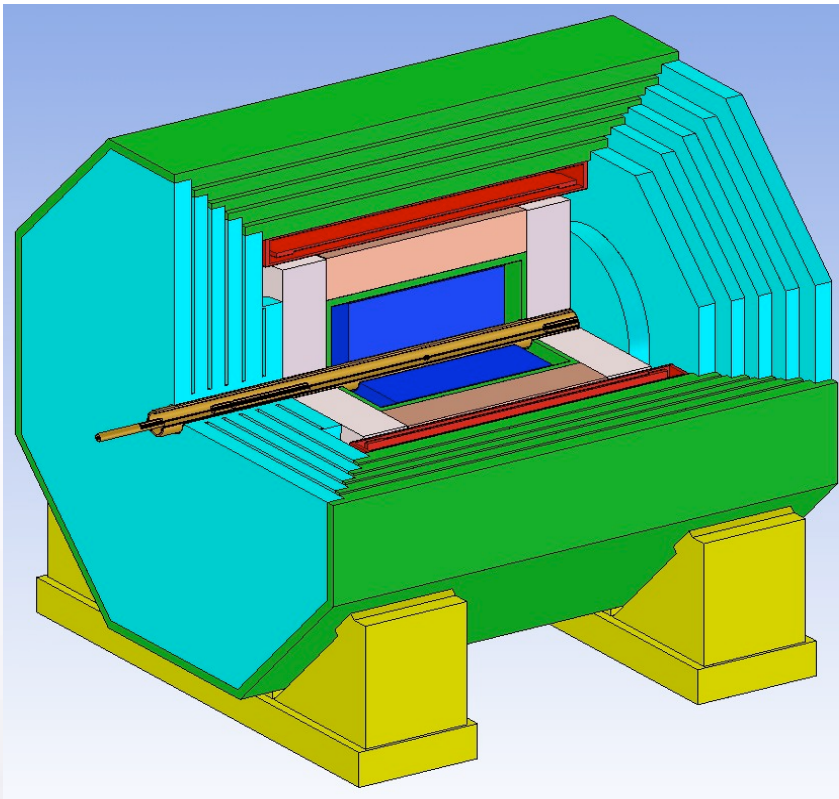
scintillator and photon sensor

R/D needed



GLD-MUON : detector

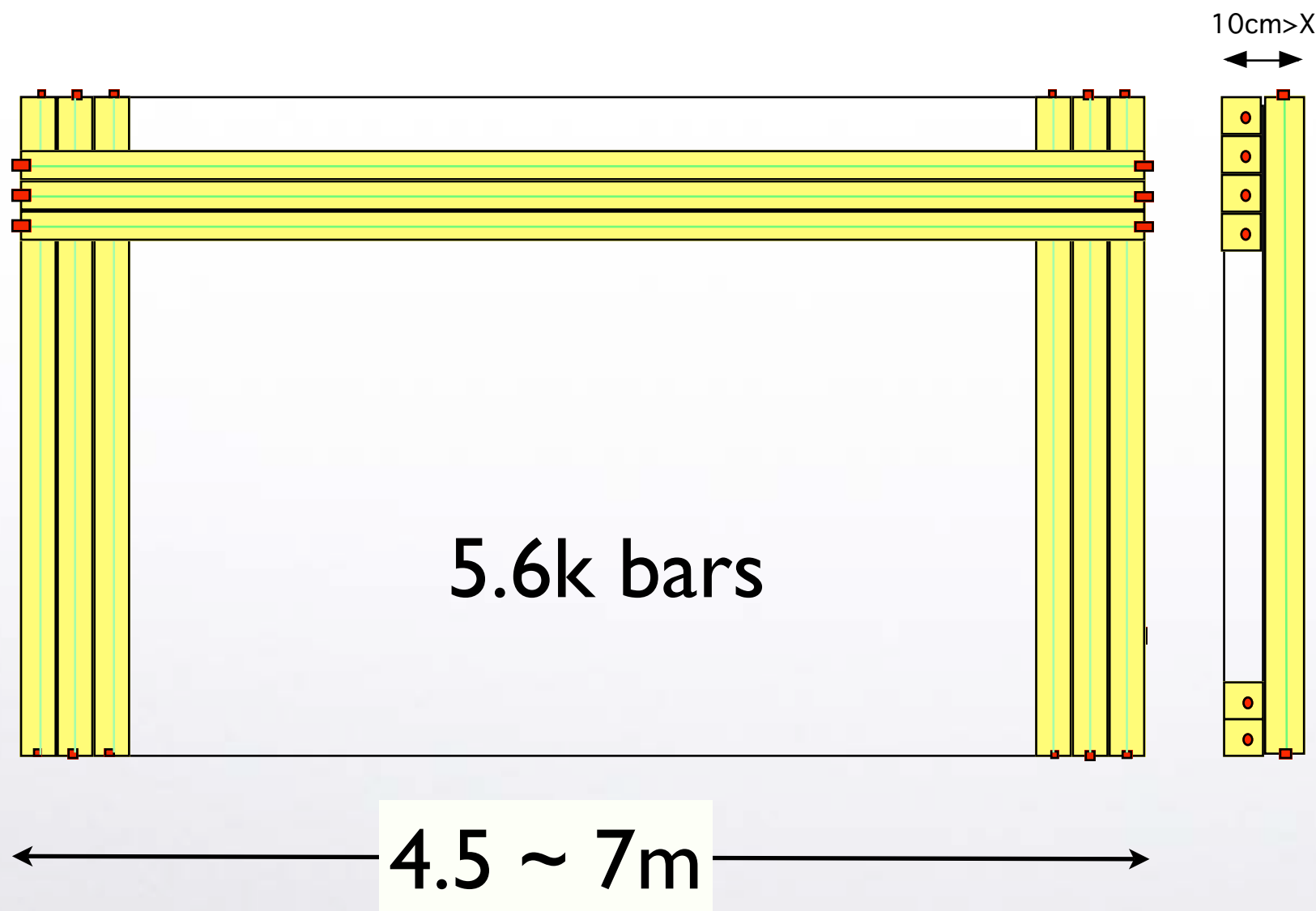
GLD detector



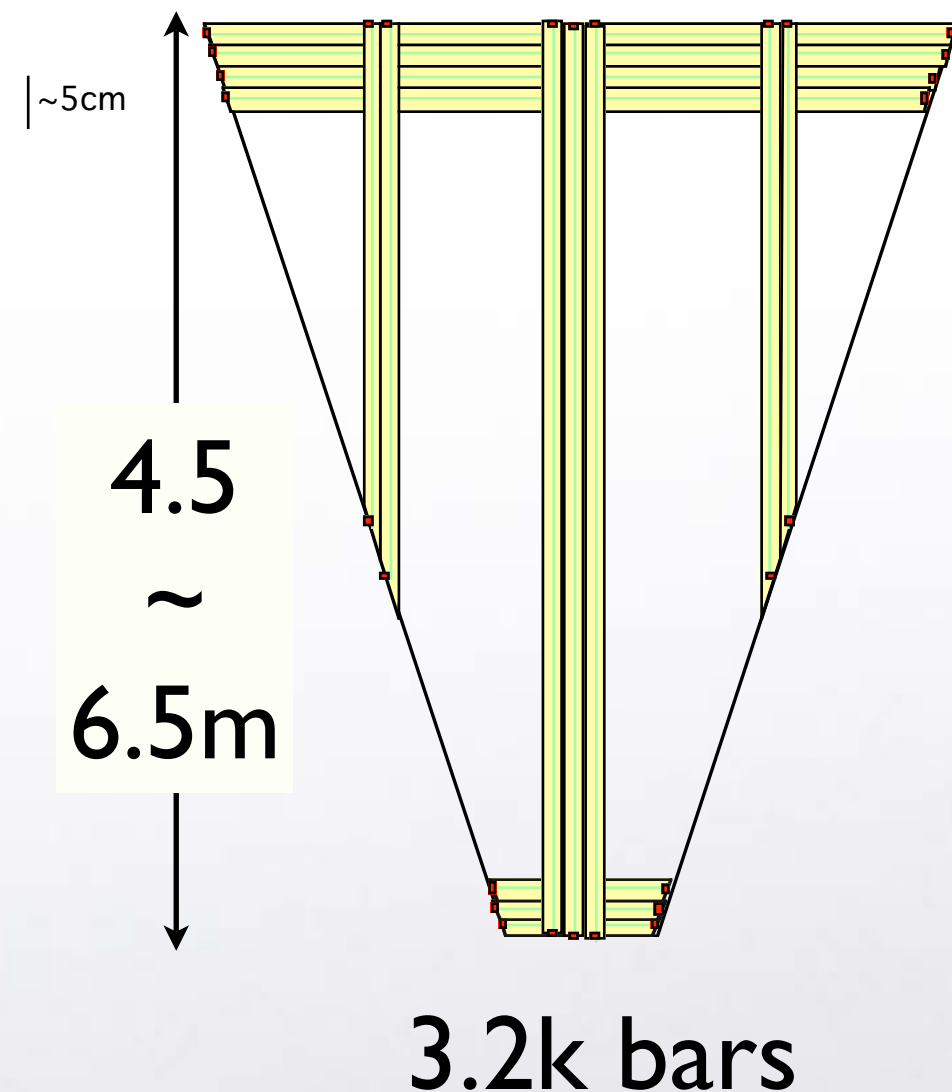
GLD-MUON : system

scintillator bars + MPC

barrel module



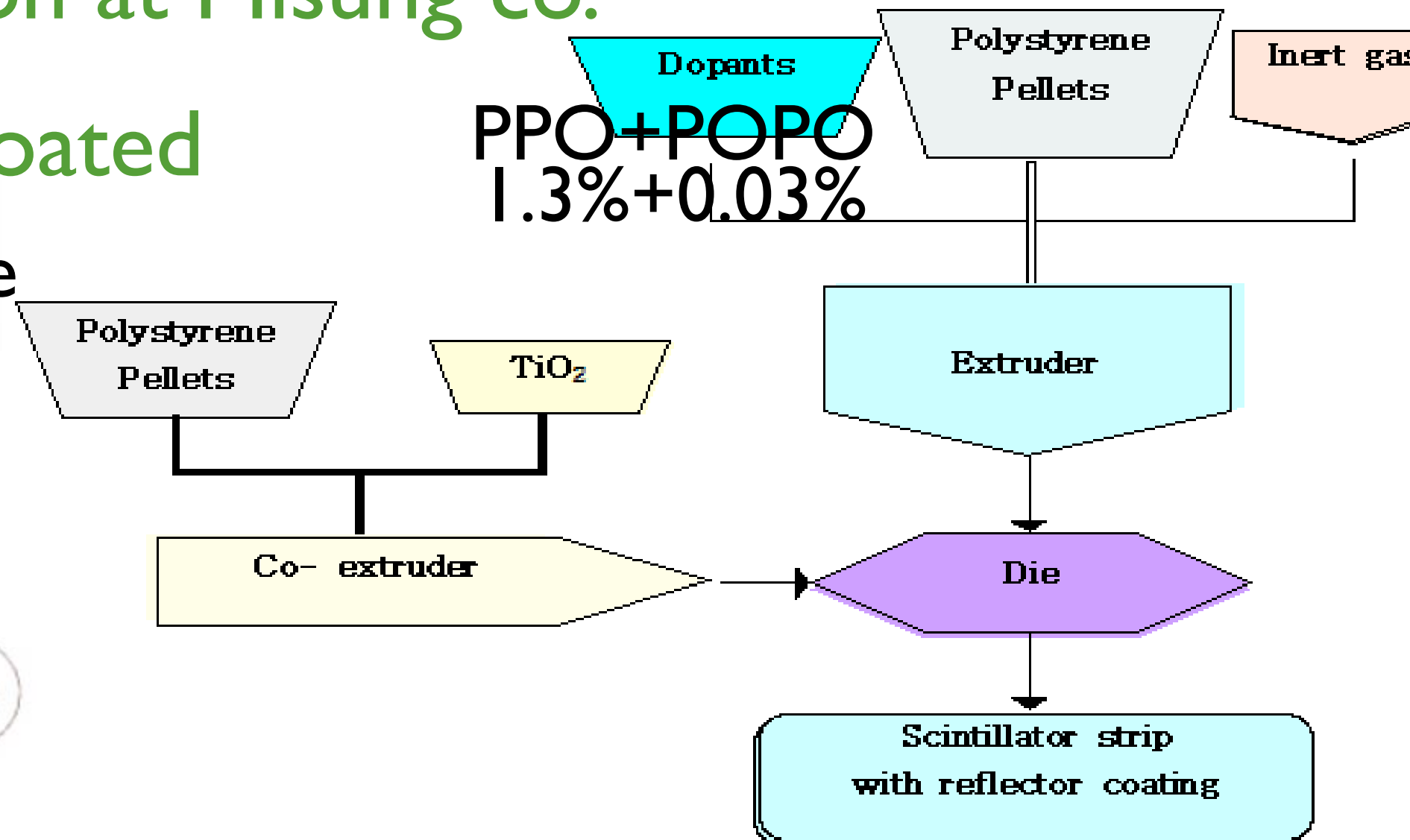
endcap module



GLD-MUON : scintillator R/D

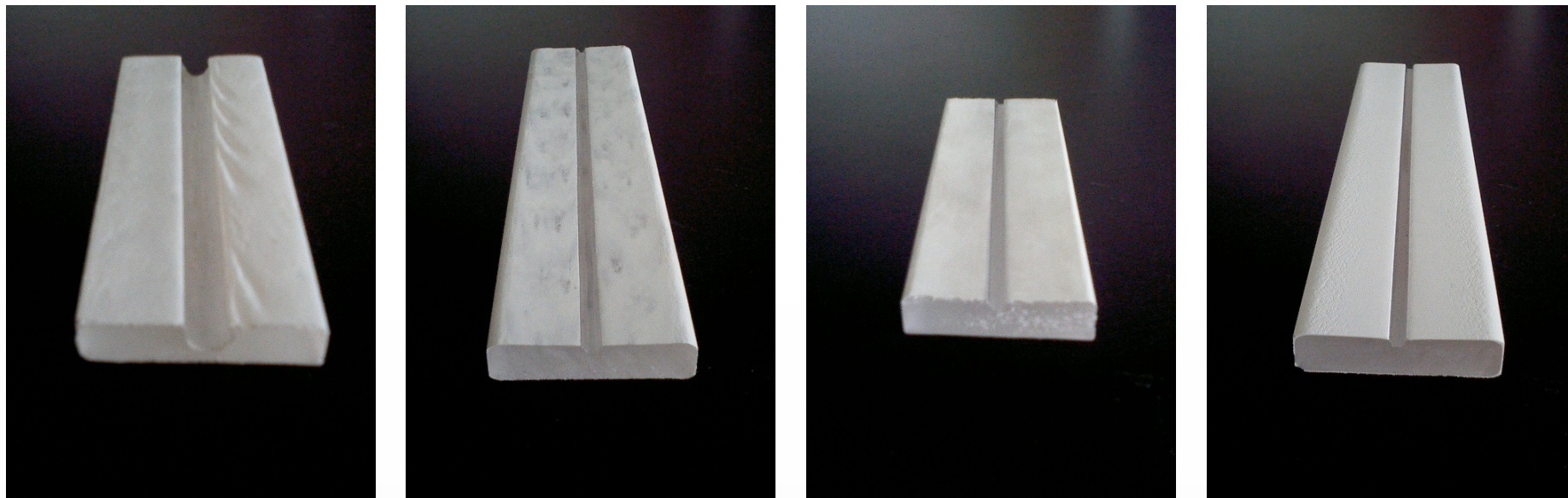
- scintillator bar R/D at Kyungpook N. U.
- production at Misung co.
 - TiO₂ coated

extrusion machine

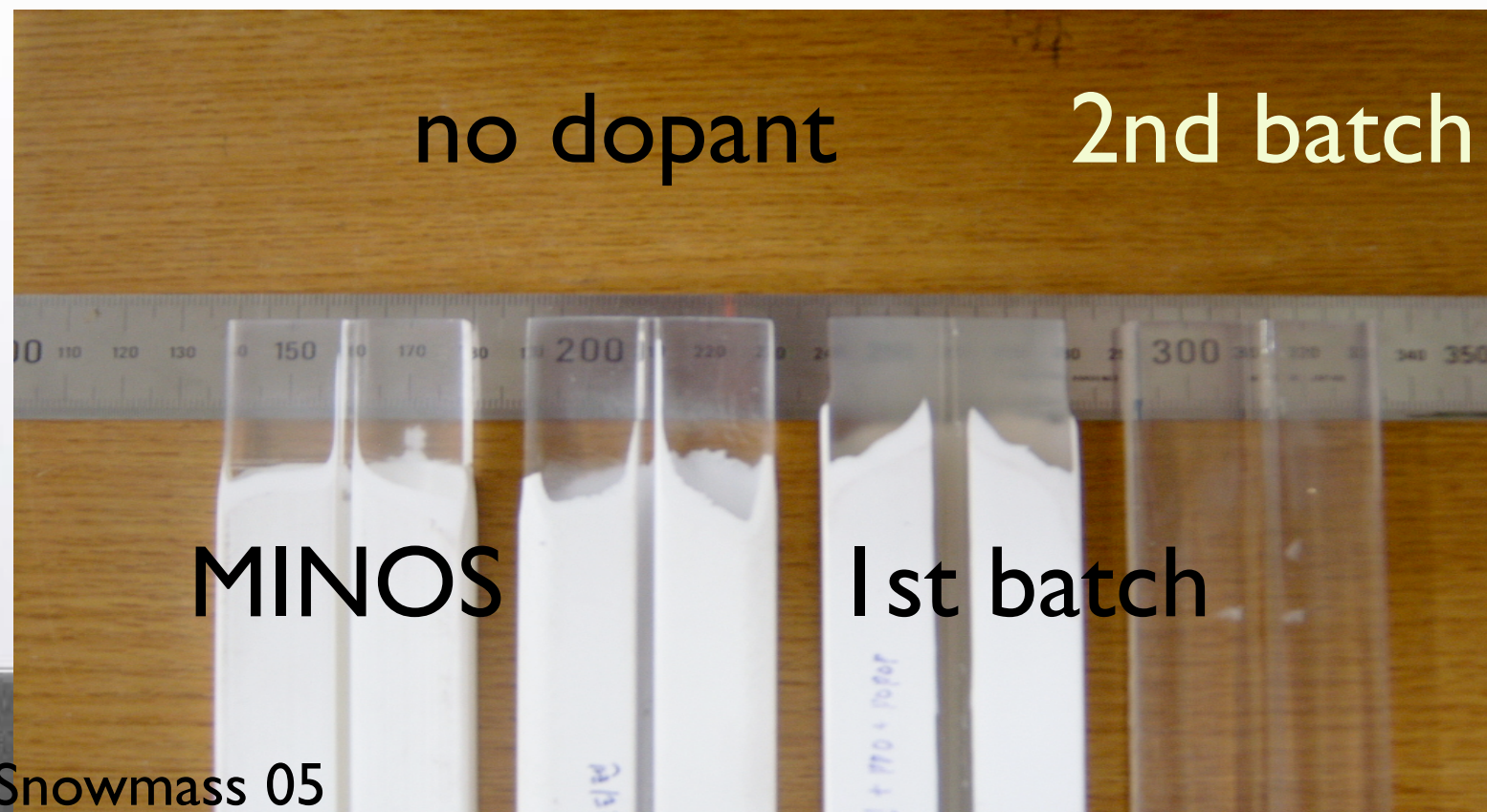


GLD-MUON : scintillator R/D cont.

- Progress

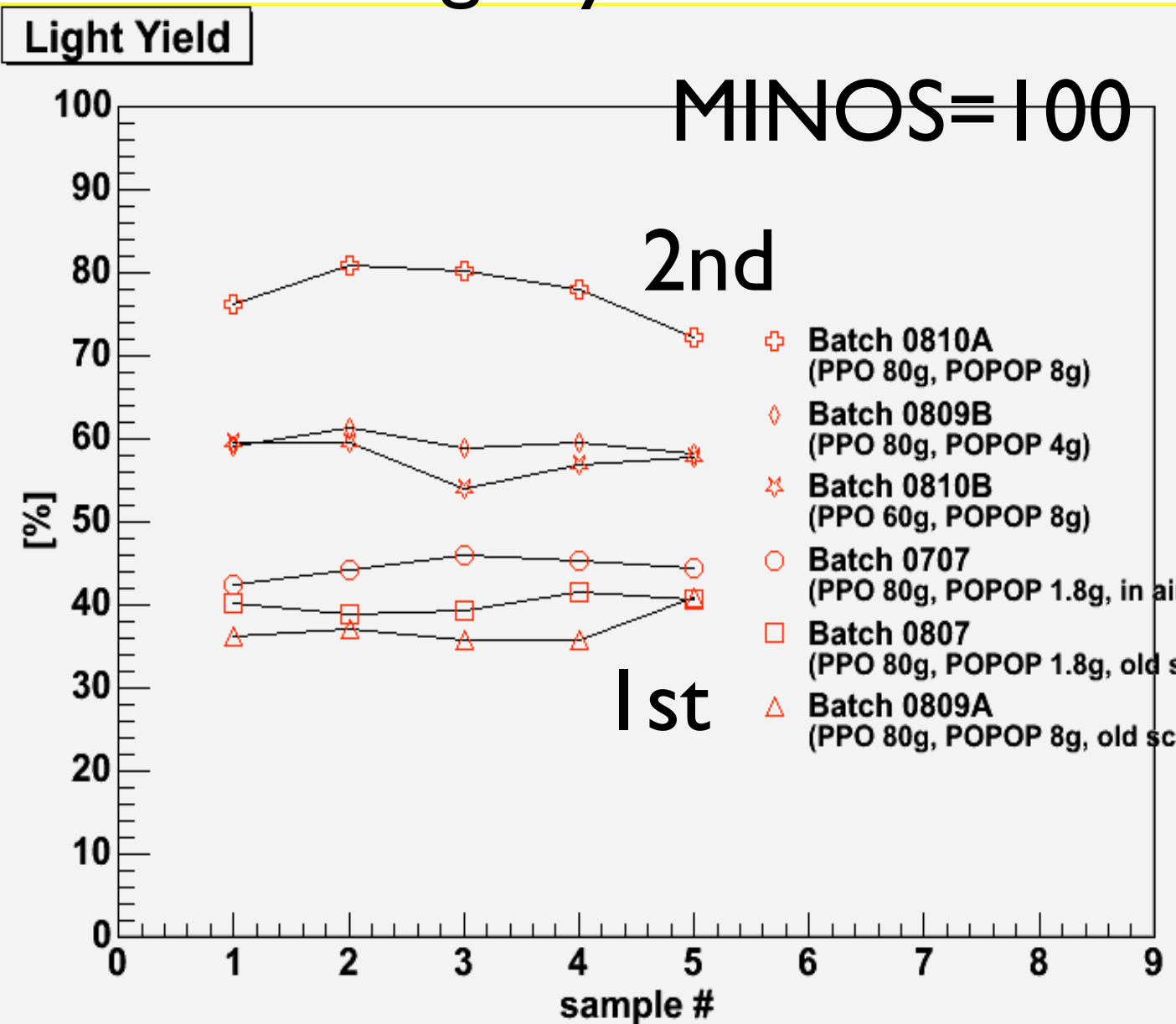


Evolution

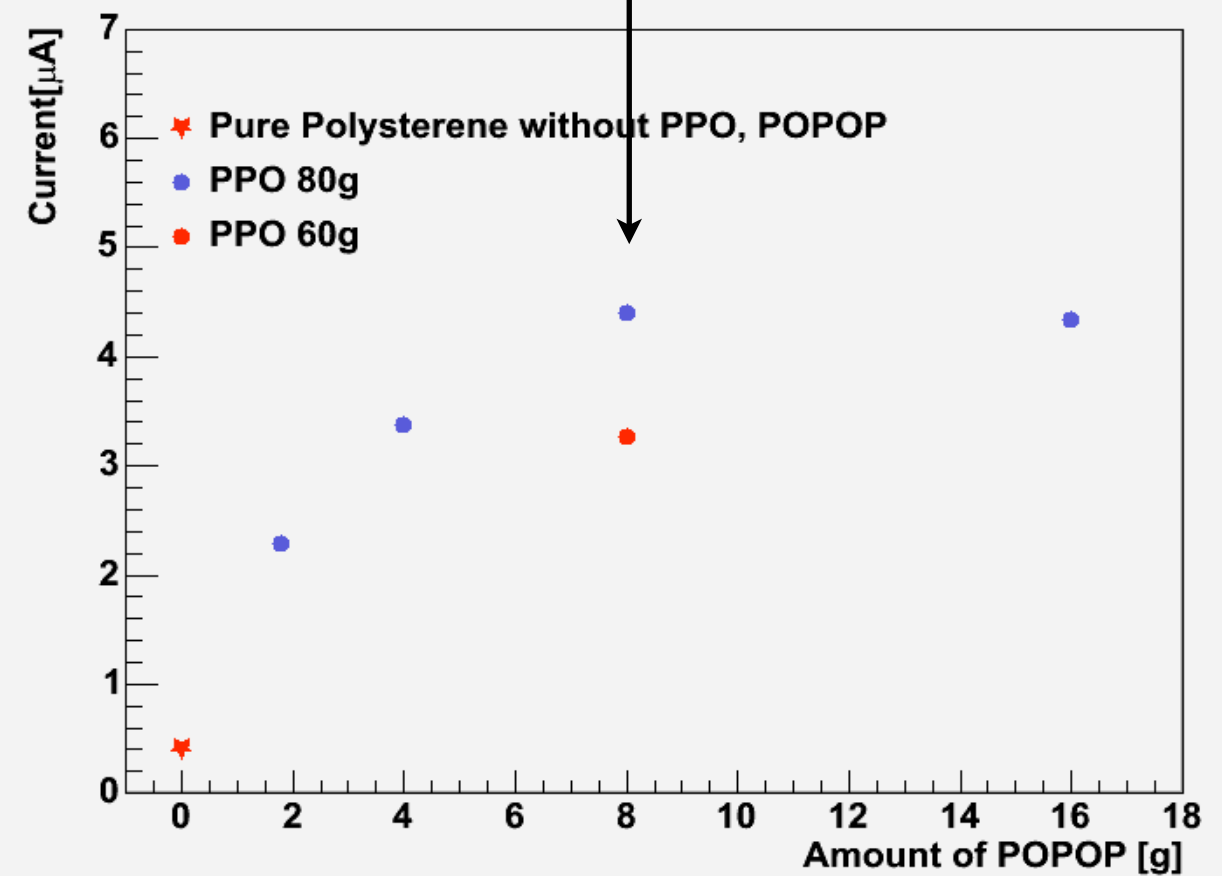


GLD-MUON : scintillator R/D cont.

● Progress and study relative light yield

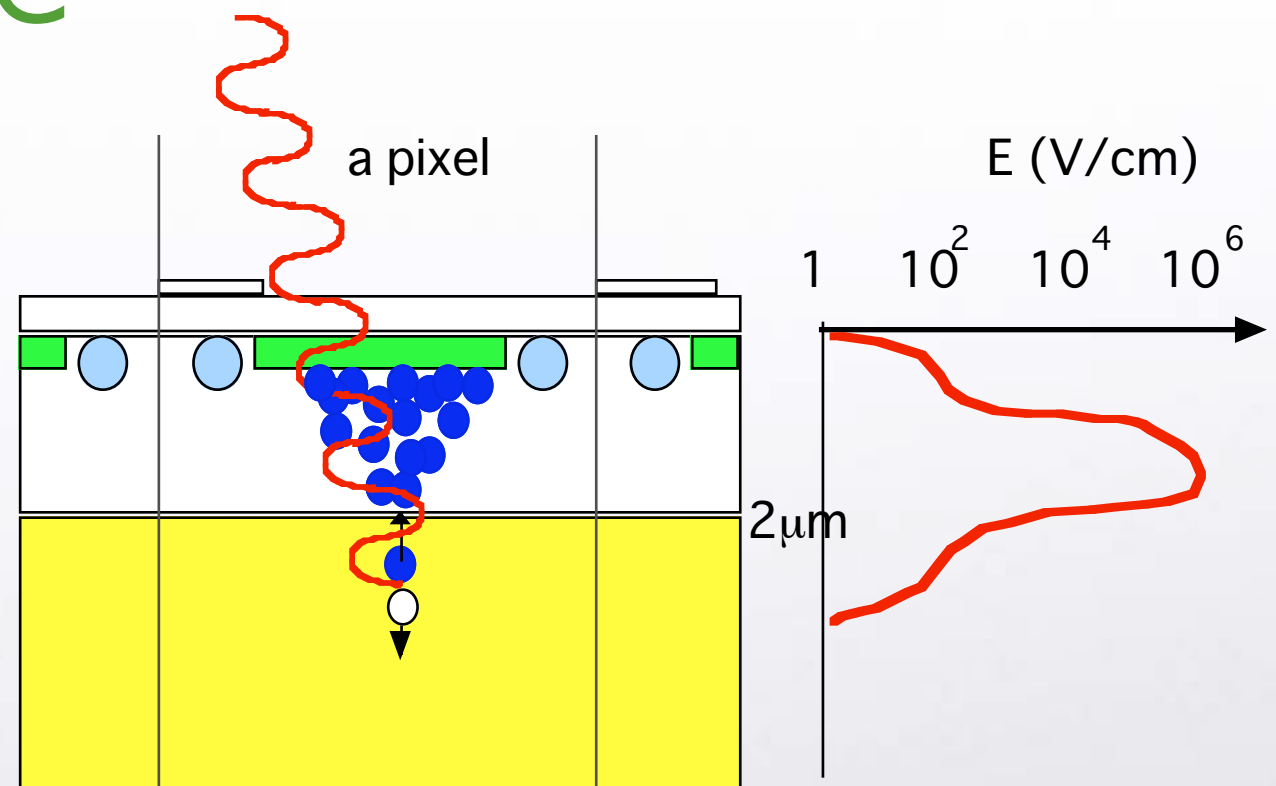
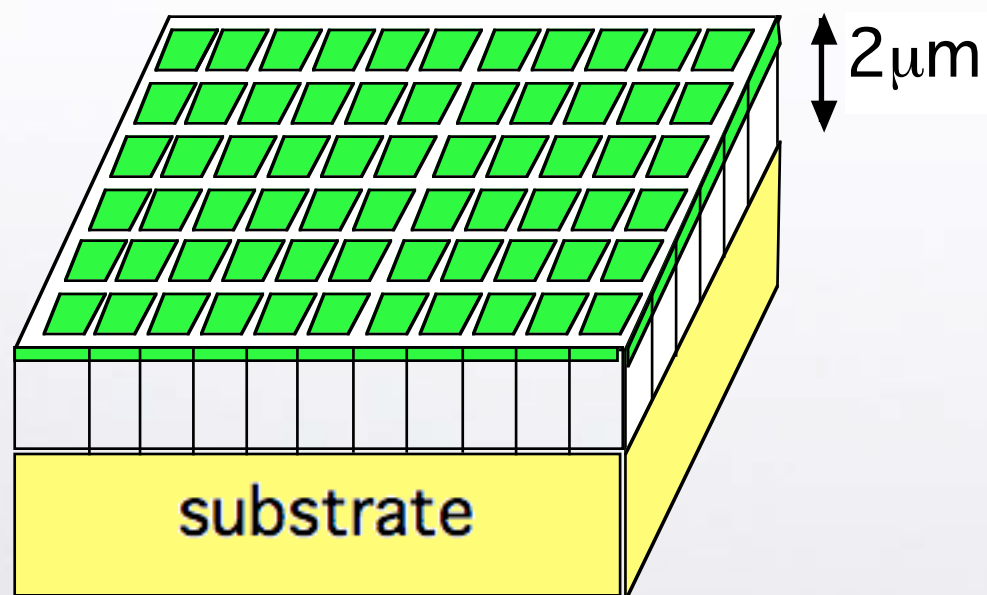


POPOP optimization



GLD-MUON : photon sensor R/D

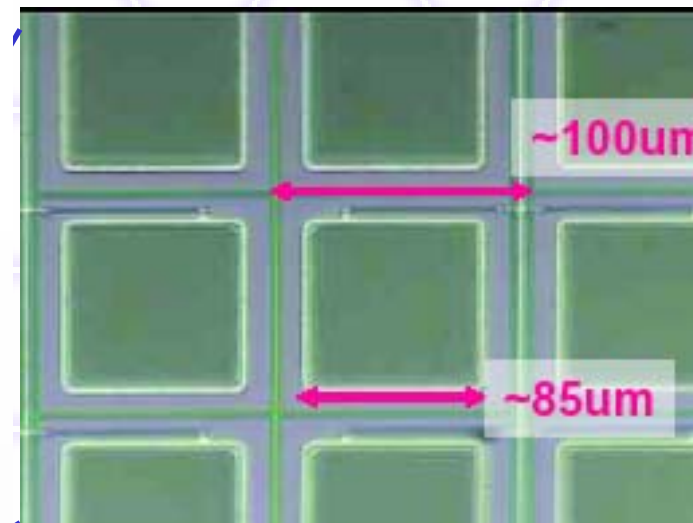
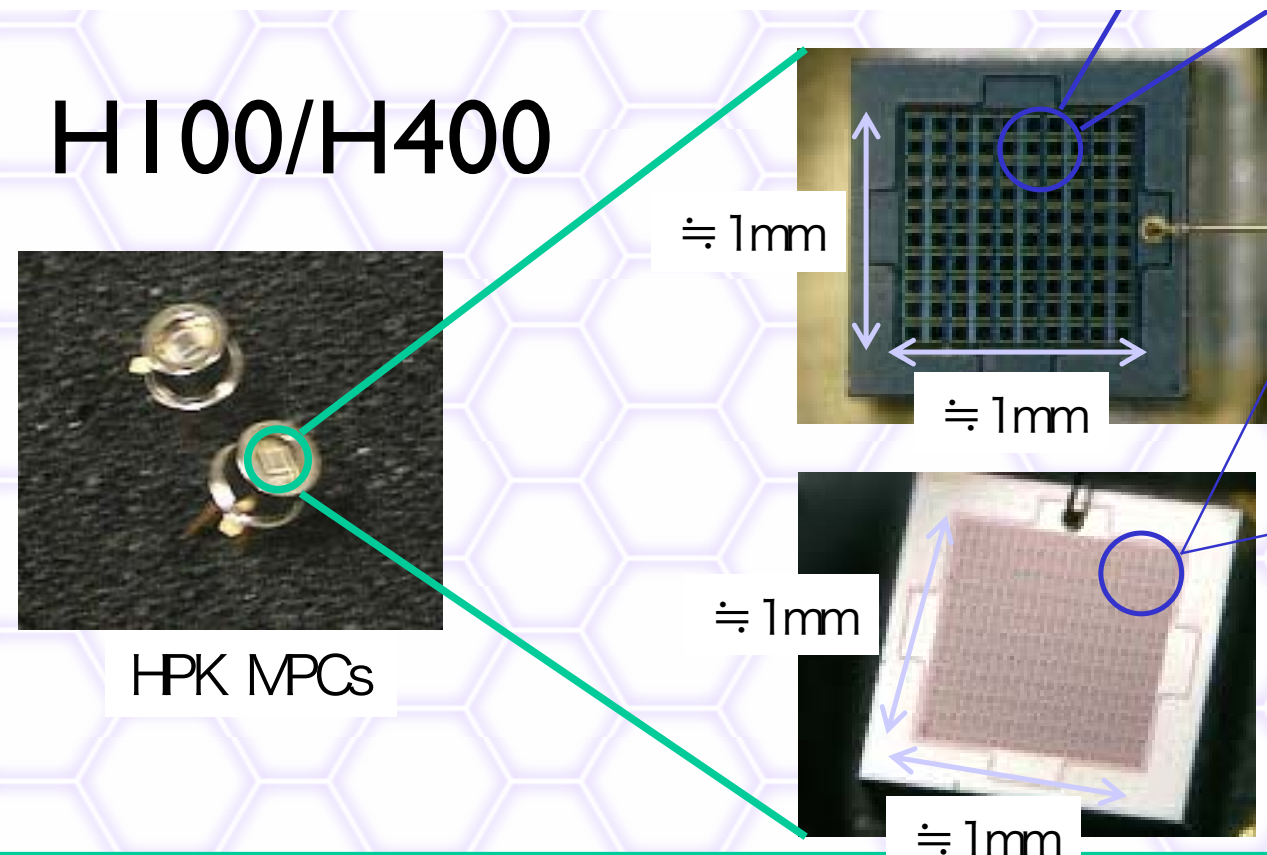
- detector is in the magnetic field of 3T
- photon sensor at the both ends of scintillator
- we need small and semi-conductor photon sensor
- candidate is SiPM or MPC



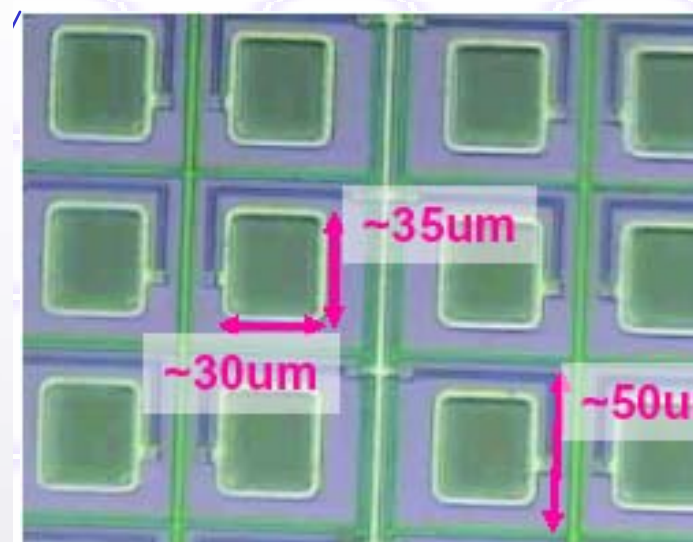
GLD-MUON : photon sensor R/D

- test samples : MPC(H100,H400) Multipixel Photon Counter and SiPM(R1156)

H100/H400

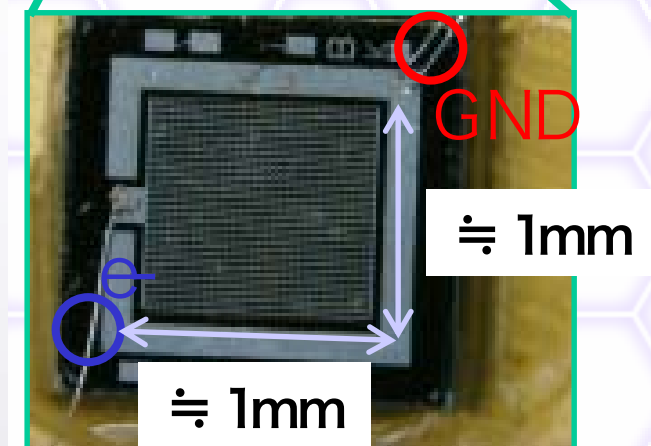
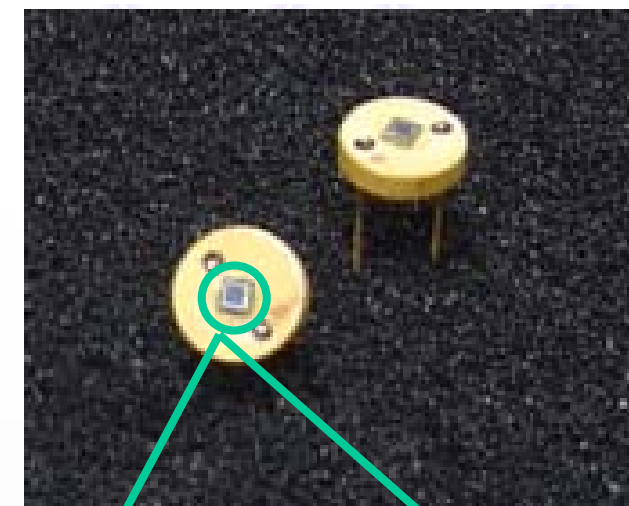


100pix $< 100\mu\text{m}$



400pix $< 50\mu\text{m}$

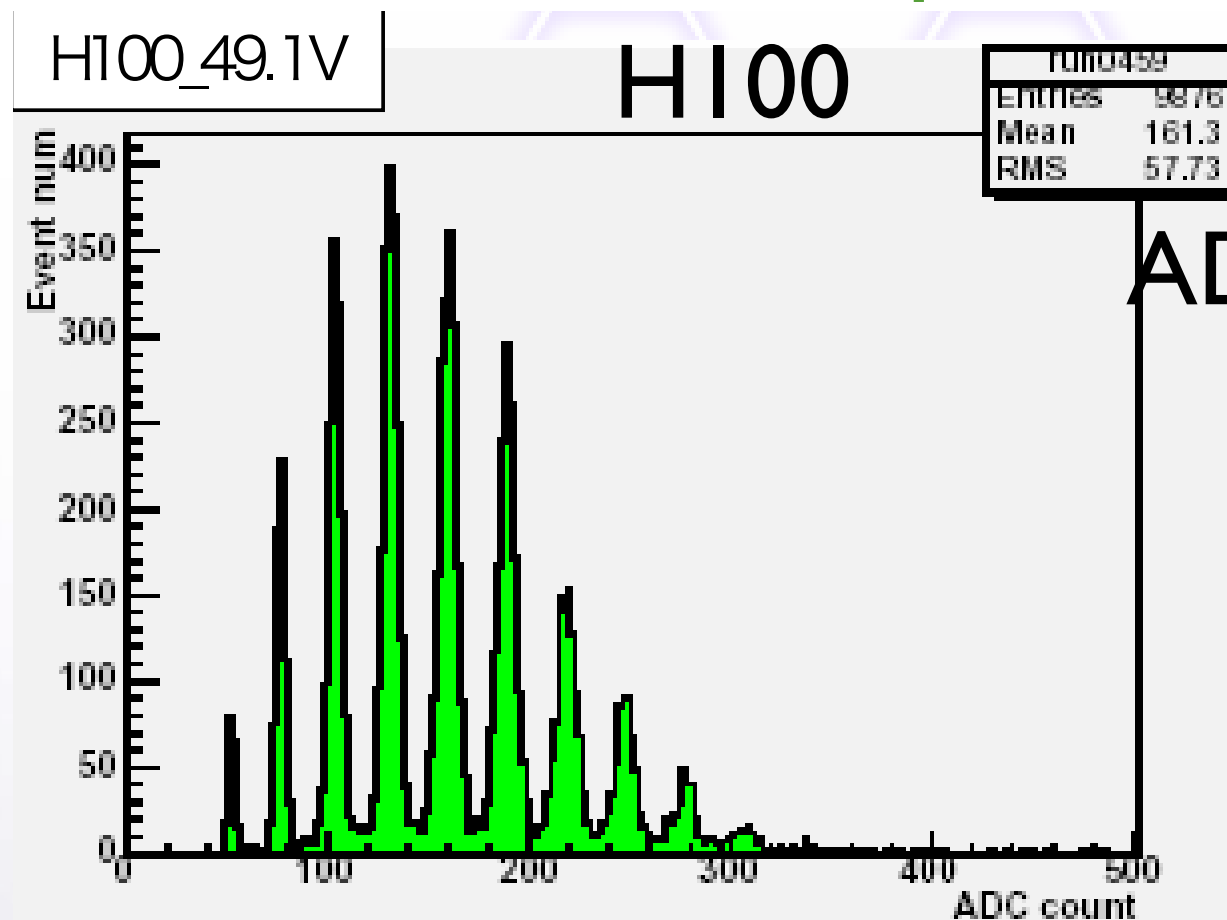
R1156



Pictures of Russian SiPM

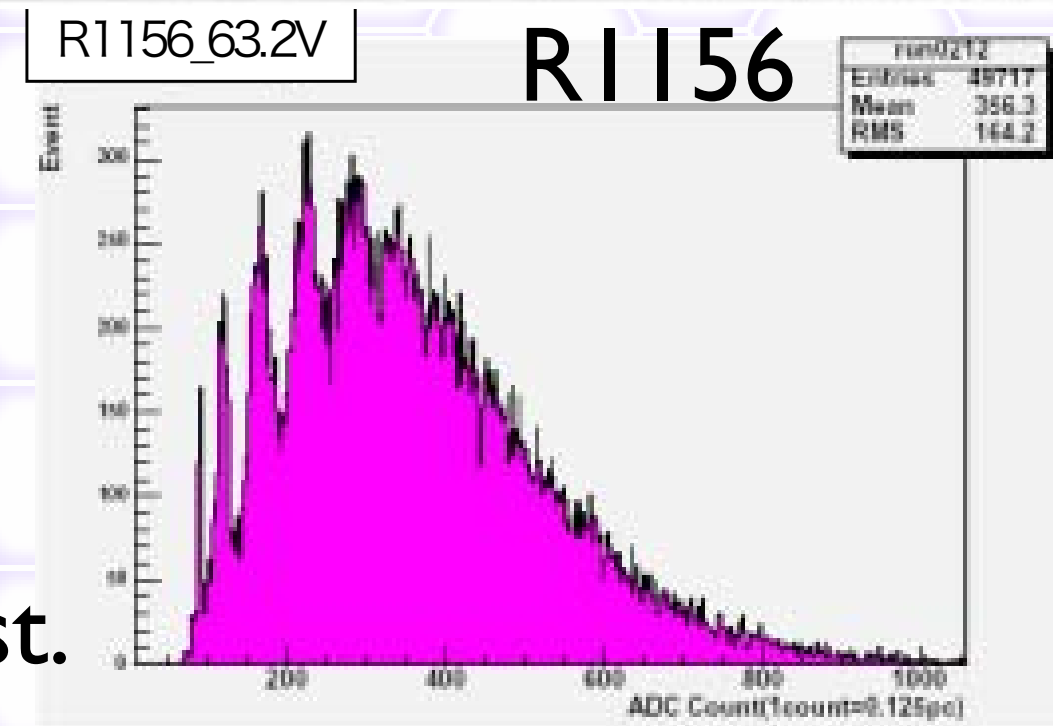
GLD-MUON : photon sensor R/D

- Photon Counting capability
- at room temperature

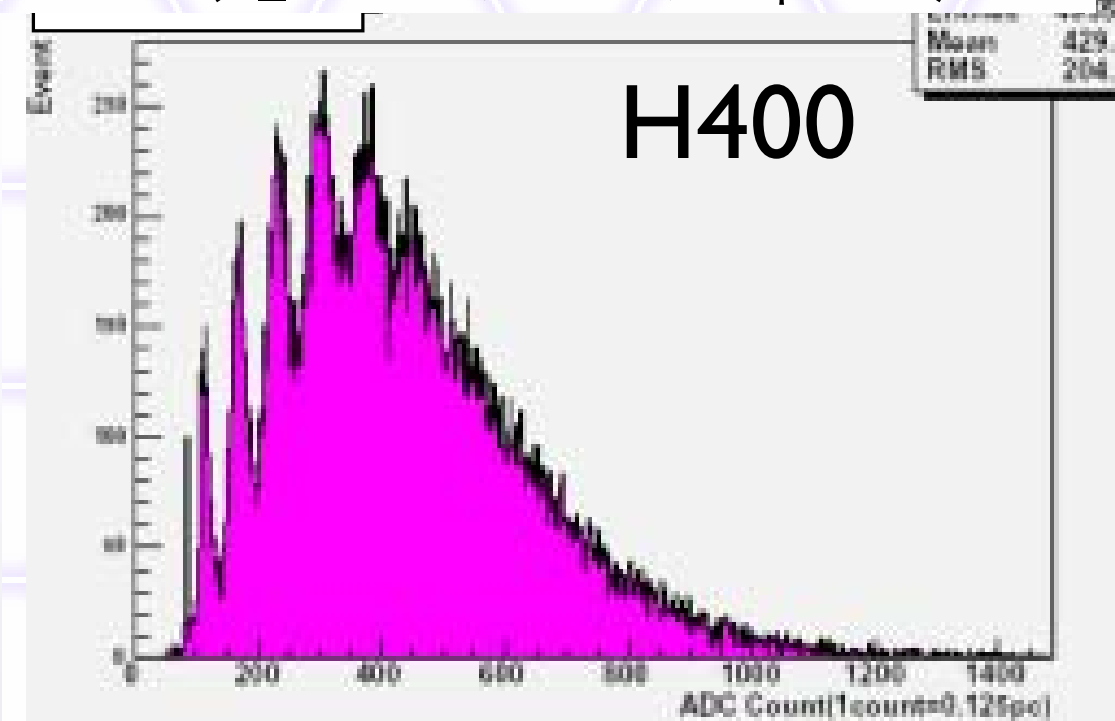


H100 ($V_B=49.1V$, $T=20C$, no AMP)

H100 is excellent



R1156 ($V_B=63.2V$, $T=20C$, Amp Used)



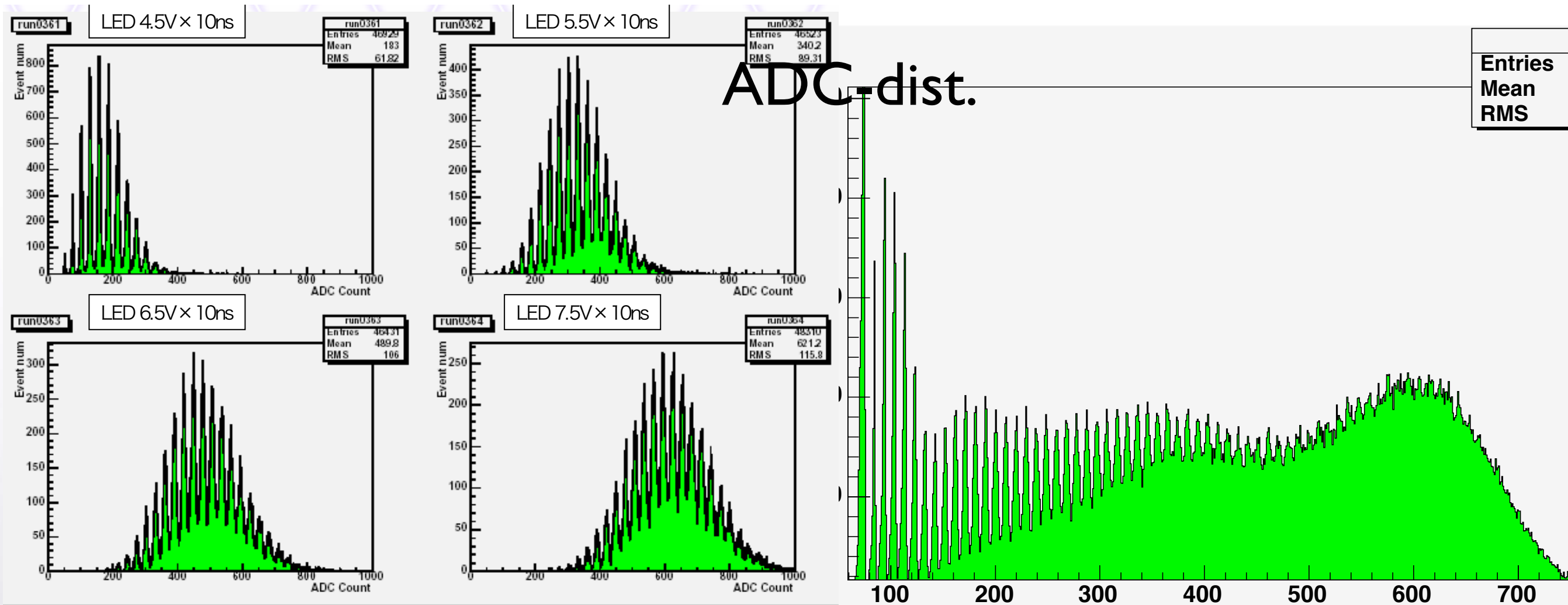
H400 ($V_B=48.8V$ $T=20C$, Amp Used)

GLD-MUON : photon sensor R/D

- MPC H100 photon counting capability

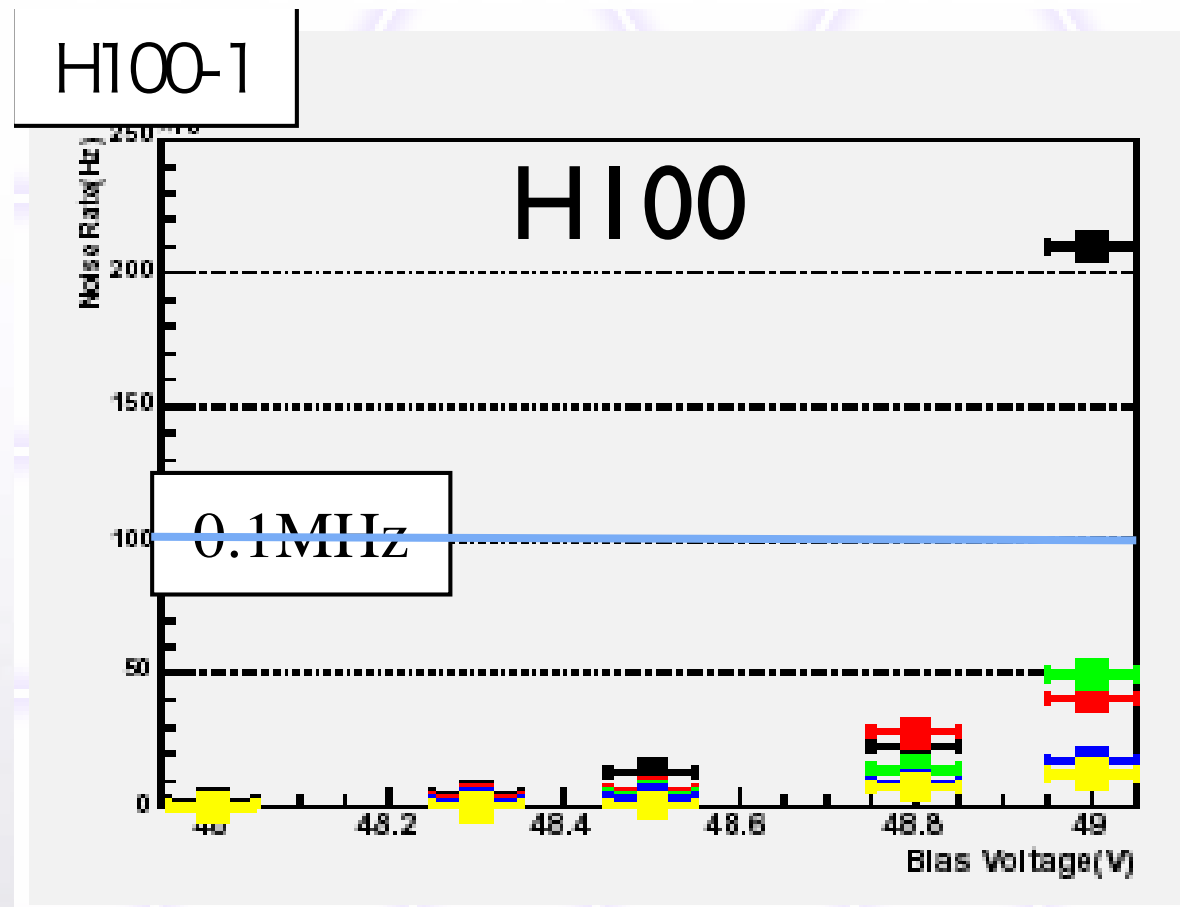
different led drive voltages

changing led pulse width

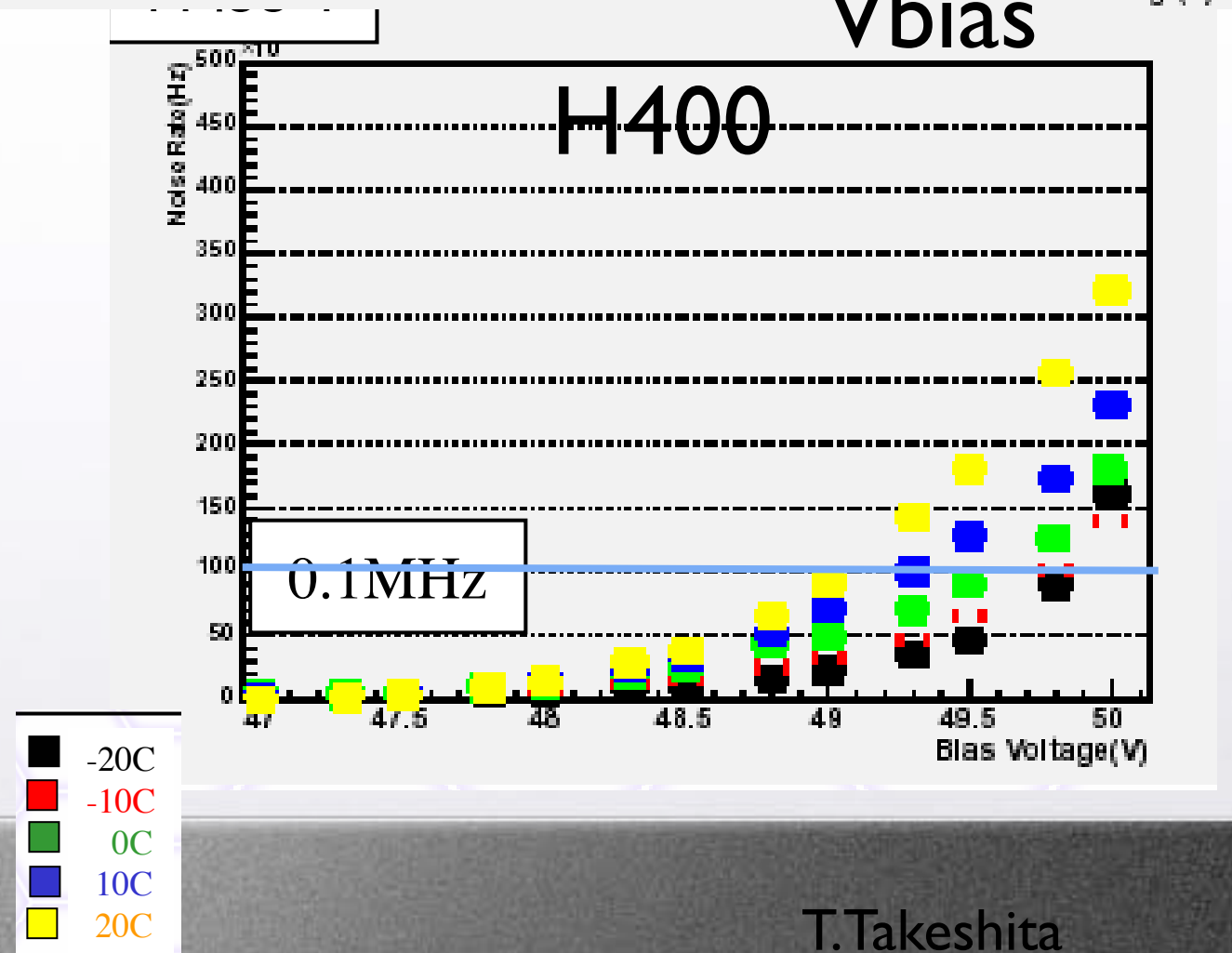
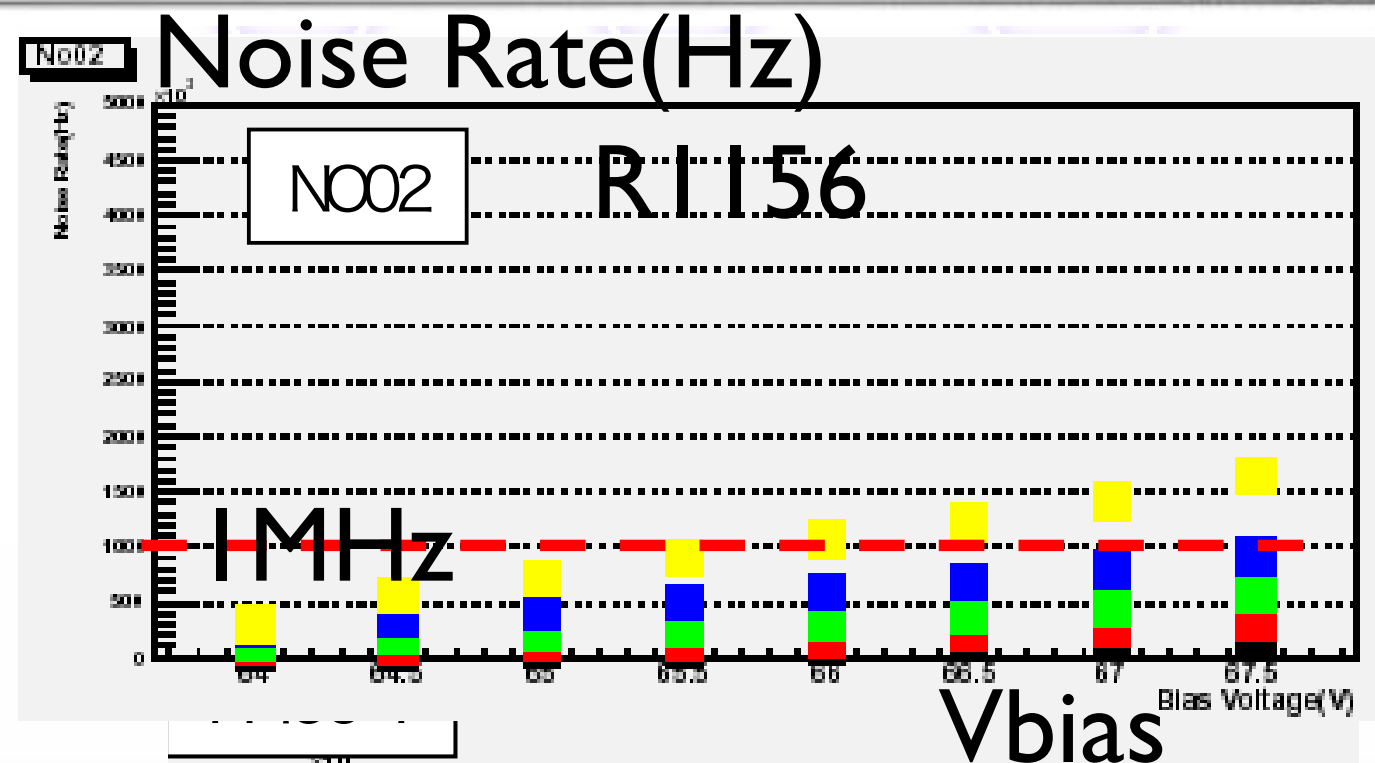


GLD-MUON : photon sensor R/D

- Noise rate
 - -30mV threshold
 - with amp (x200)



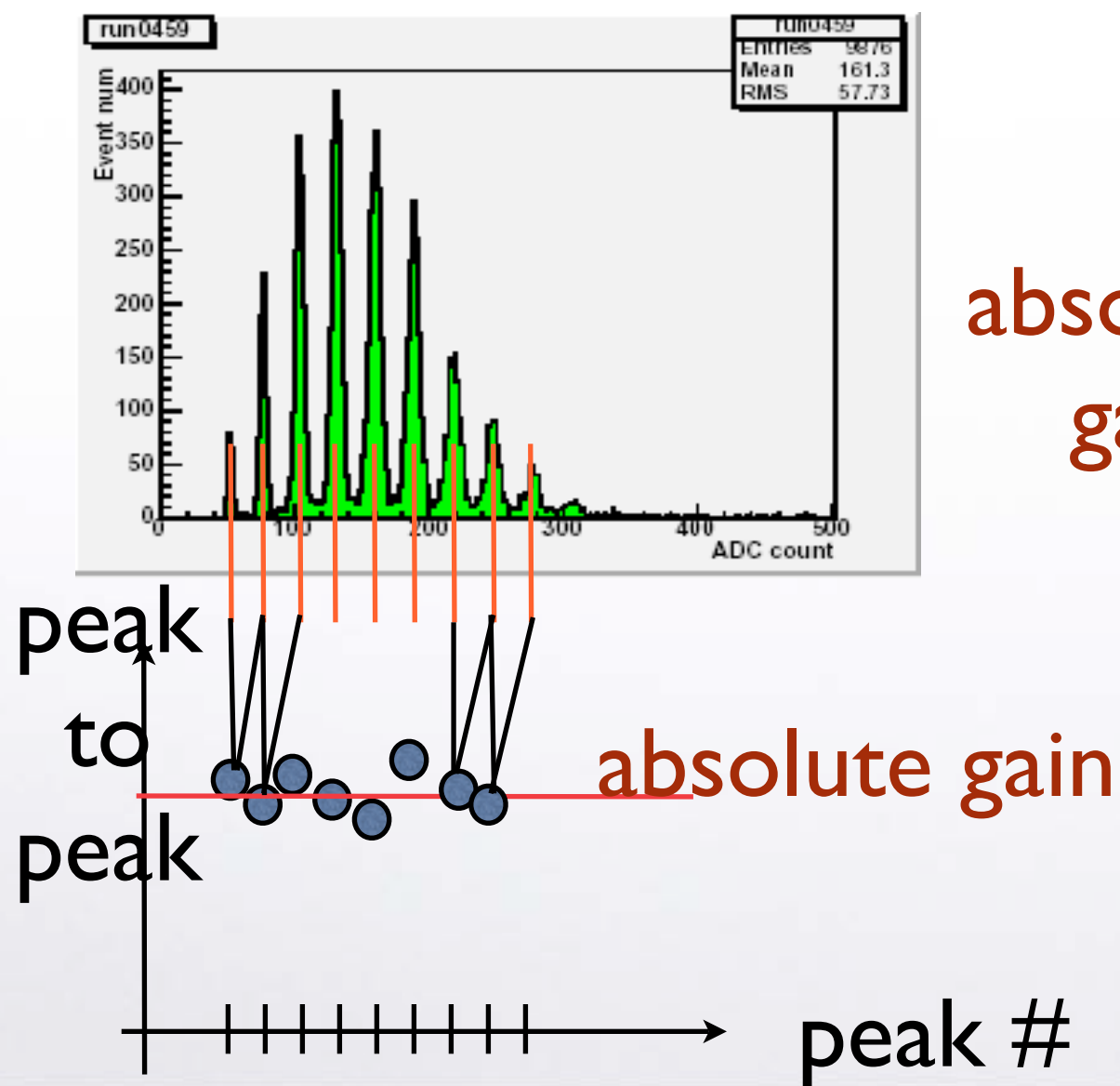
MPC's are calm



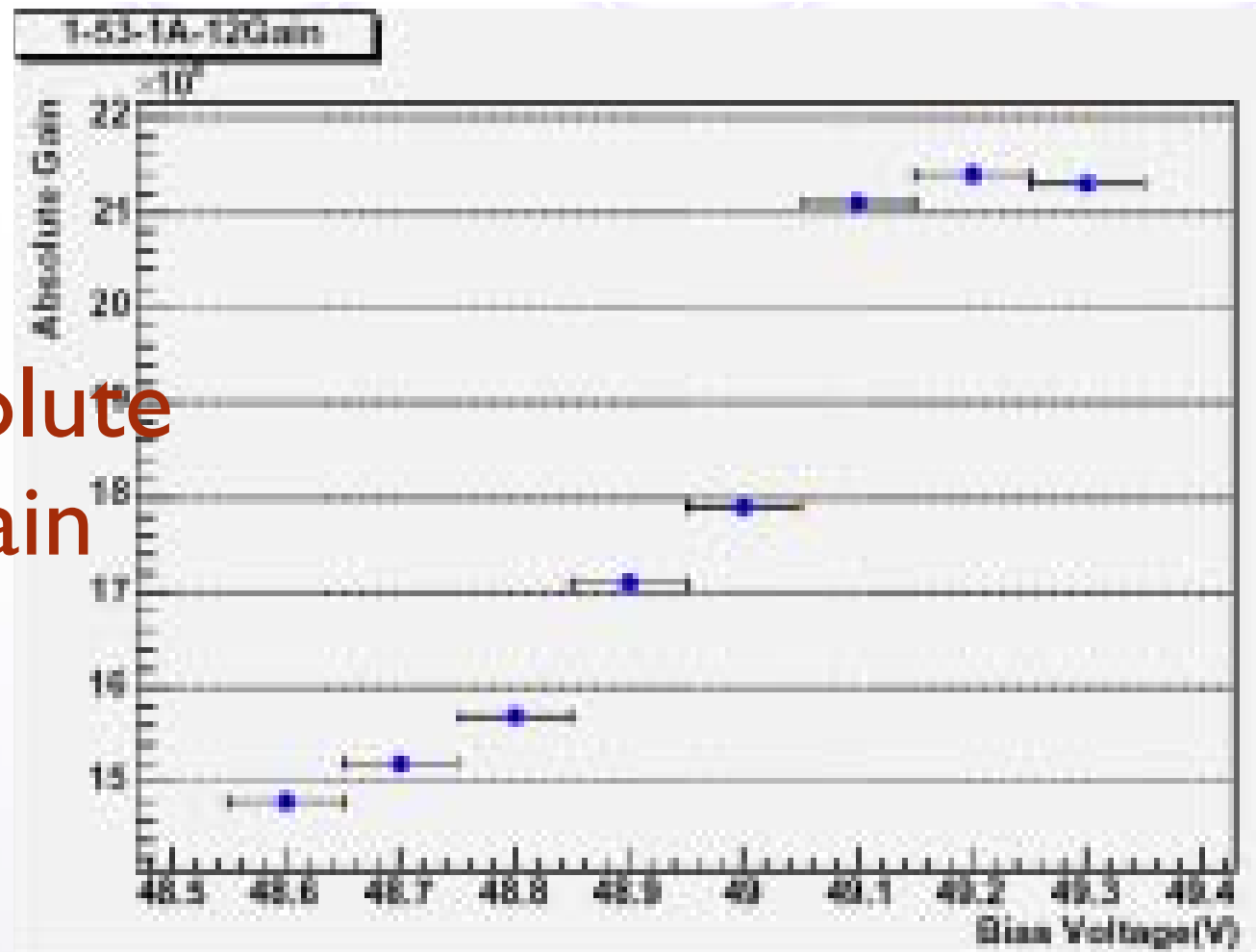
photon sensor R/D cont.

- absolute gain for H100
- gain $\sim 2 \times 10^7$

ADC dist.



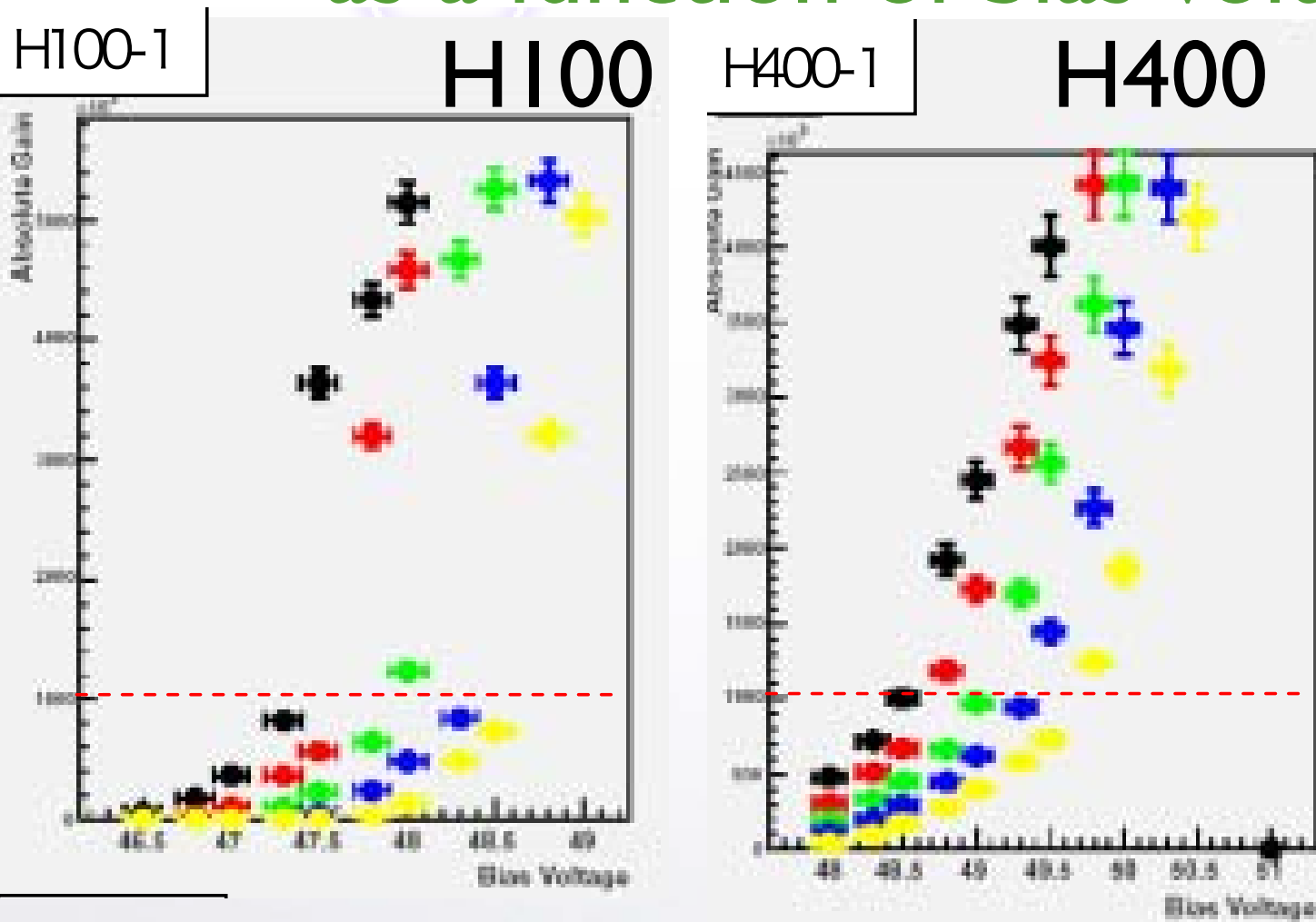
absolute
gain



Gain vs Bias Voltage V_{bias}
(Temperature 20C)

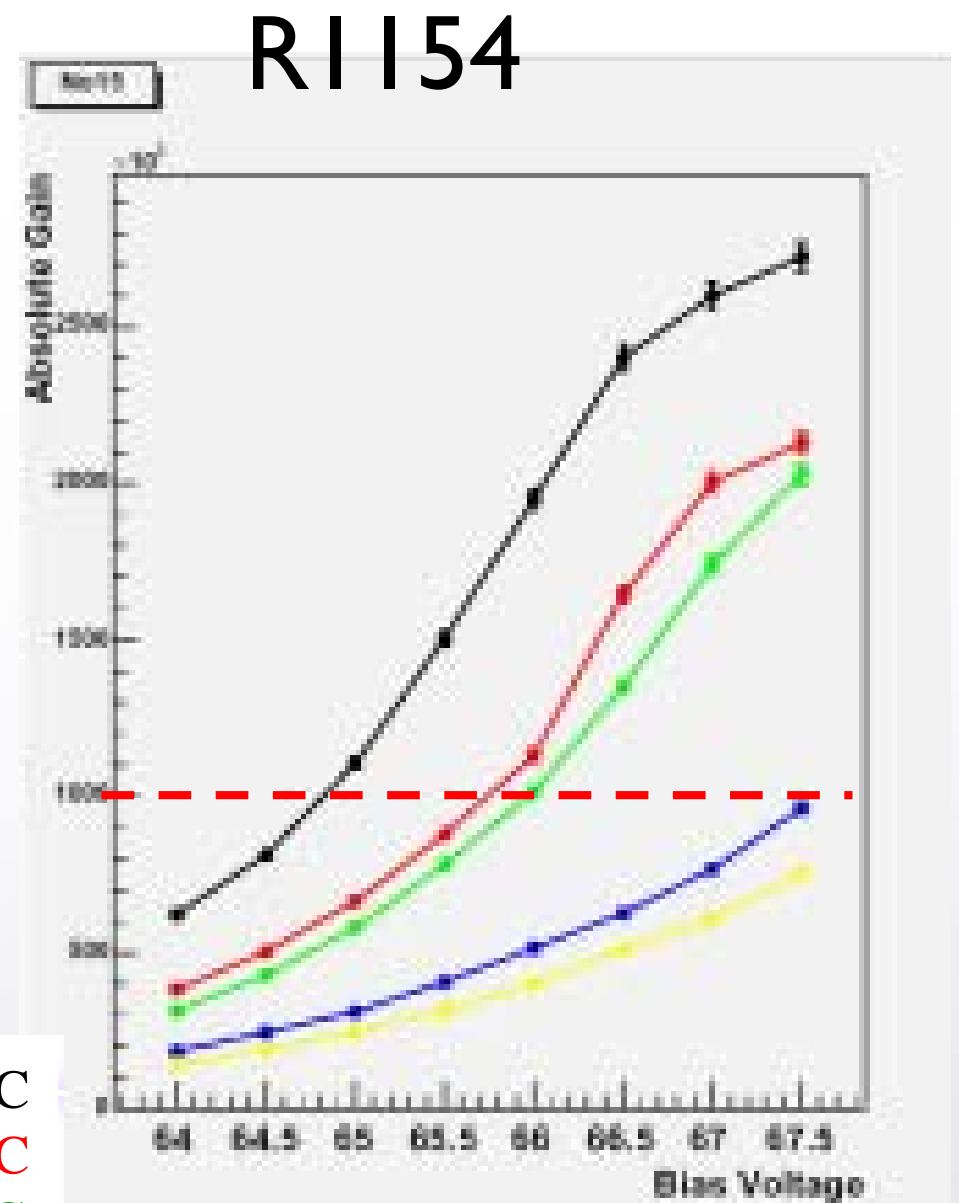
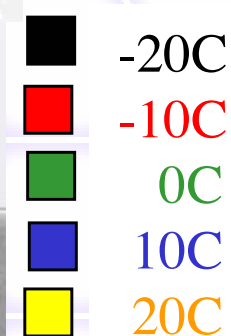
photon sensor R/D cont.

- gain vs temperature
- as a function of bias voltage



higher gain at lower temp.

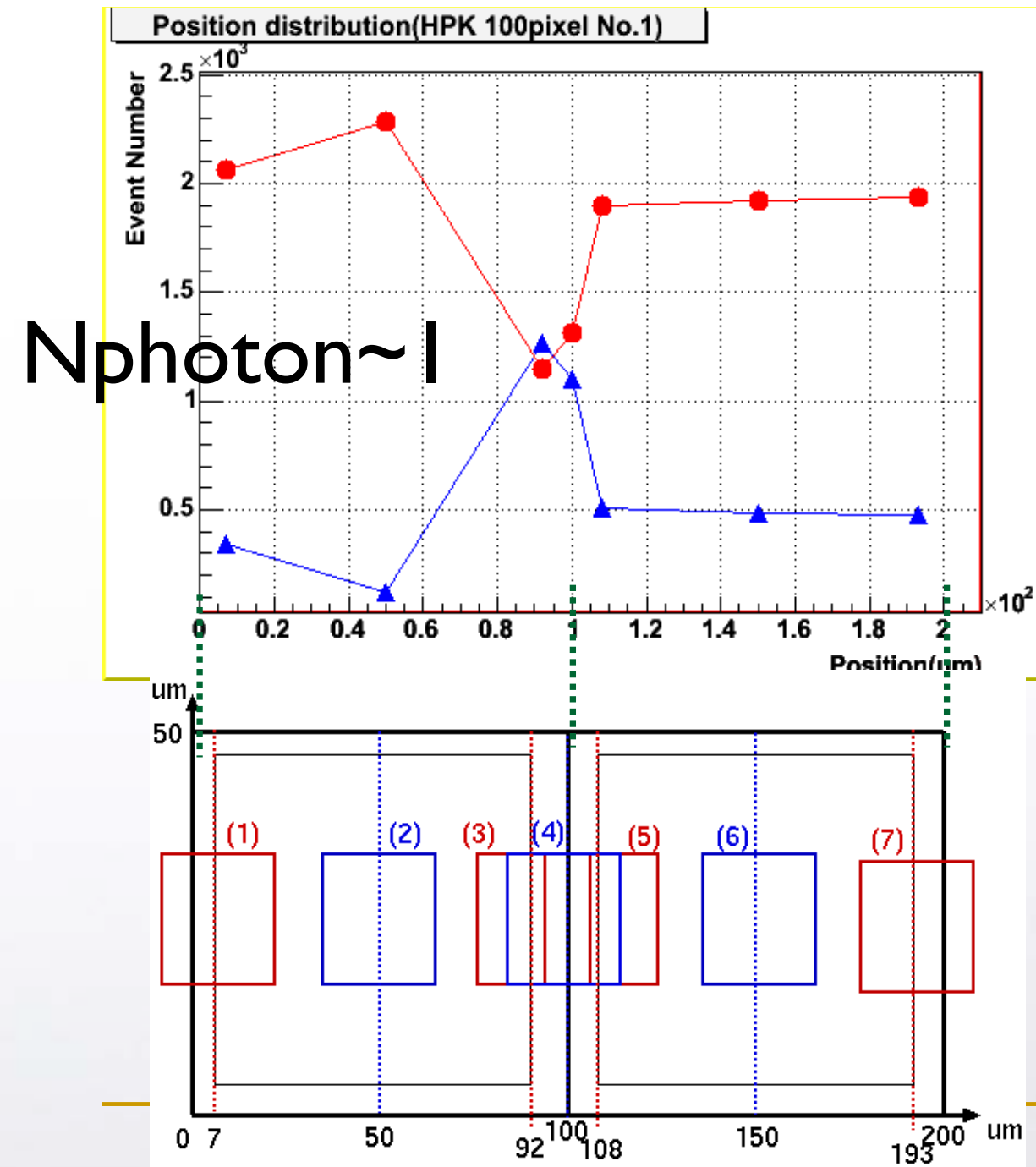
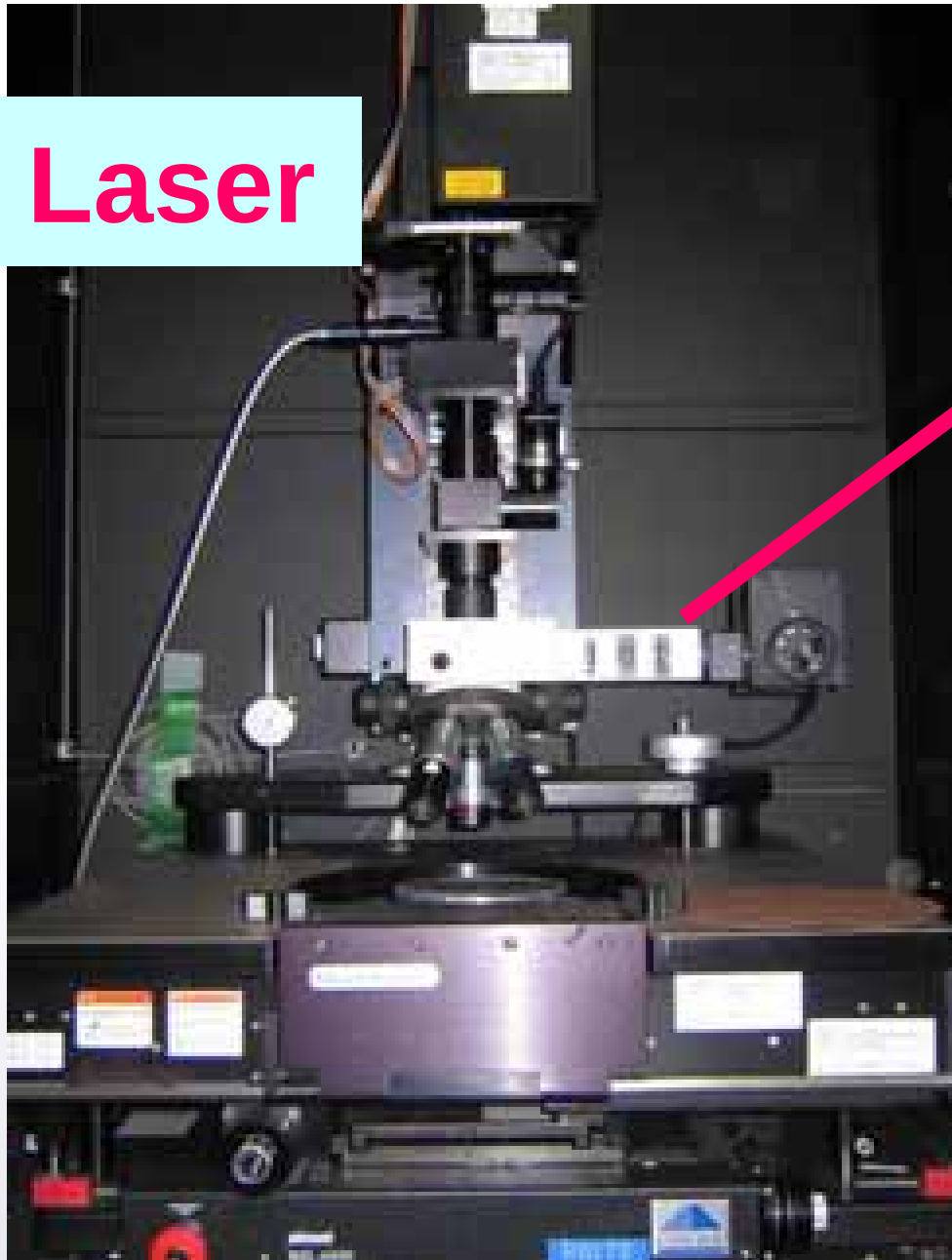
gain
 10^6



photon sensor R/D cont.

- pixel to pixel test by laser photon 532nm

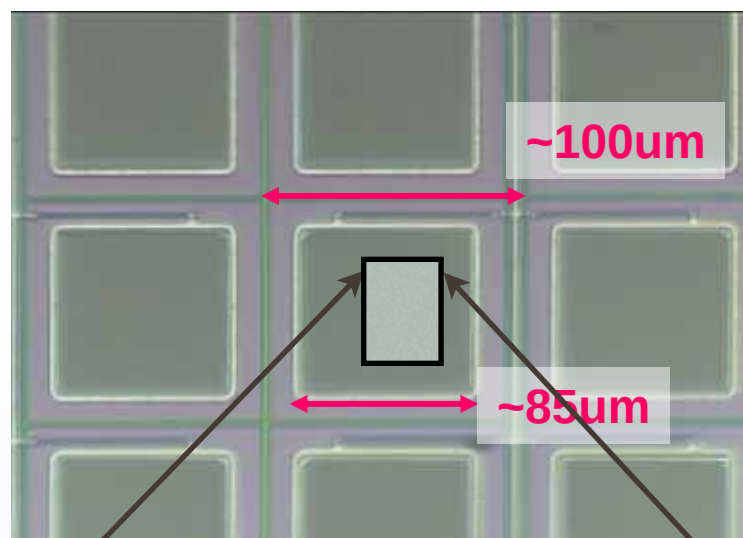
YAG Laser



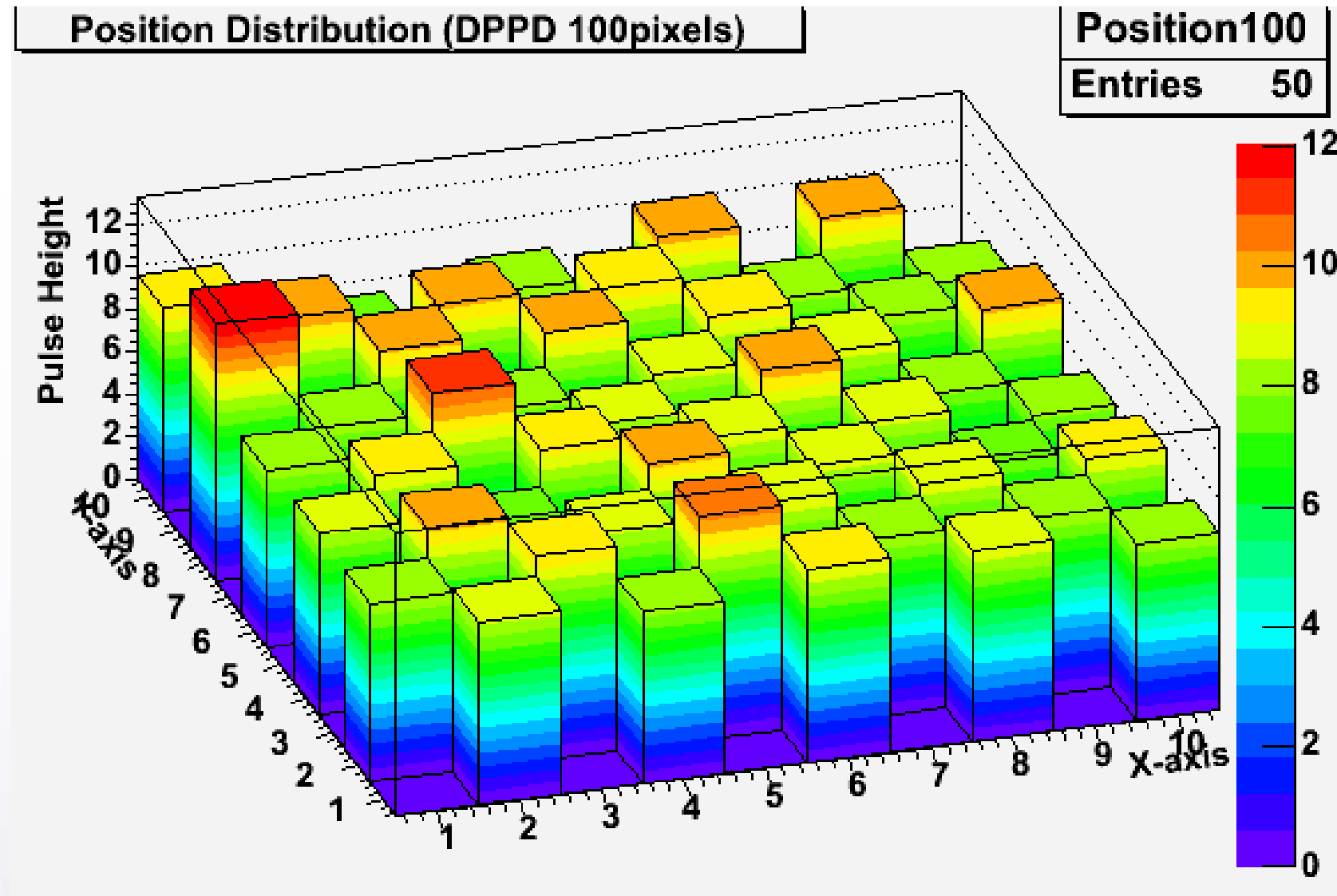
photon sensor R/D cont.

- pixel test by laser photon

H100-0



laser beam spot



photon sensor R/D cont.

- to do list
 - linearity (saturation)
 - efficiency (overall and pixel)
 - X talk ? (pixel to pixel)
 - device to device difference
- improve MPC with Hamamatsu PK.

GLD-muon R/D

- scintillator production is in progress
- photon sensor R/D is on going
- beam test a bar+2MPC's this fall
- simulation effort is needed for realistic muon detector
 - efficiency for muon/ misidentification
 - optimum number of layers
 - thickness of the bar