TaichuPix1 Measurement

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Analog front end parameter

Table 1 (Chip2 Internal DAC)

Bias	IBIAS	ITHR	IDB	VCLIP	VCASP	VCASN	VCASN2	VRESET
Design value	440 nA	4.5 nA	1 µA	0/0.2 V	0.6 V	0.55 V	0.5 V	1.4 V
Config. value	440nA	1.5nA	1uA	0.068V	0.6V	0.55V	0.5V	1.71V

Table 2 (Chip2 External BIAS VBG=800mV VBIAS=900mV)

Bias	IBIAS	ITHR	IDB	VCLIP	VCASP	VCASN	VCASN2	VRESET
Design value	440 nA	4.5 nA	1 µA	0/0.2 V	0.6 V	0.55 V	0.5 V	1.4 V
Config. value	440nA	3.5nA	1uA	0.043V	0.64V	0.57V	0.68V	1.71V

Table 3 (Chip2 External BIAS VBG=800mV VBIAS=900mV)

Bias	IBIAS	ITHR	IDB	VCLIP	VCASP	VCASN	VCASN2	VRESET
Design value	440 nA	4.5 nA	1 µA	0/0.2 V	0.6 V	0.55 V	0.5 V	1.4 V
Config. value	440nA	4.5nA	1uA	0.043V	0.6V	0.55V	0.5V	1.71V
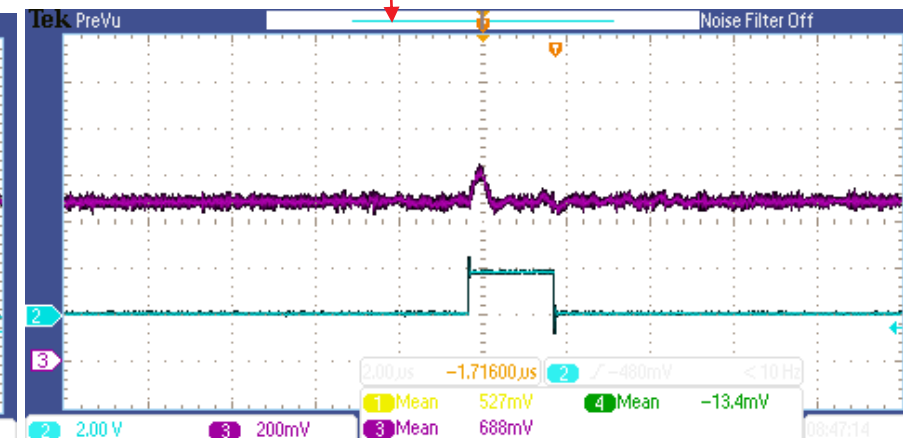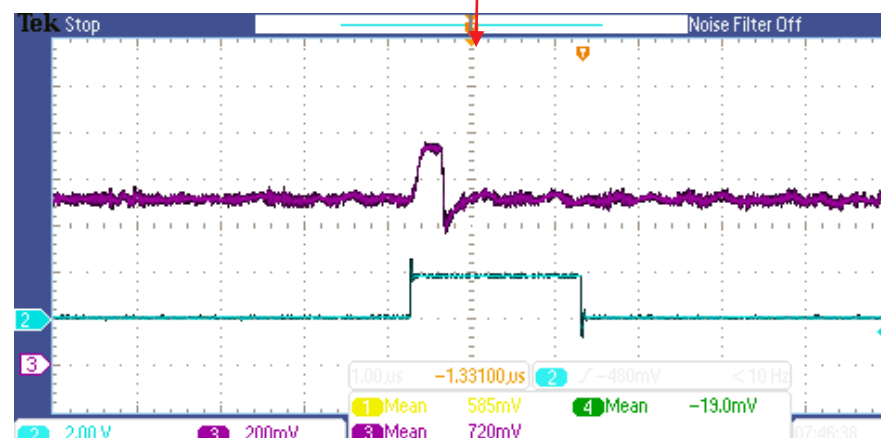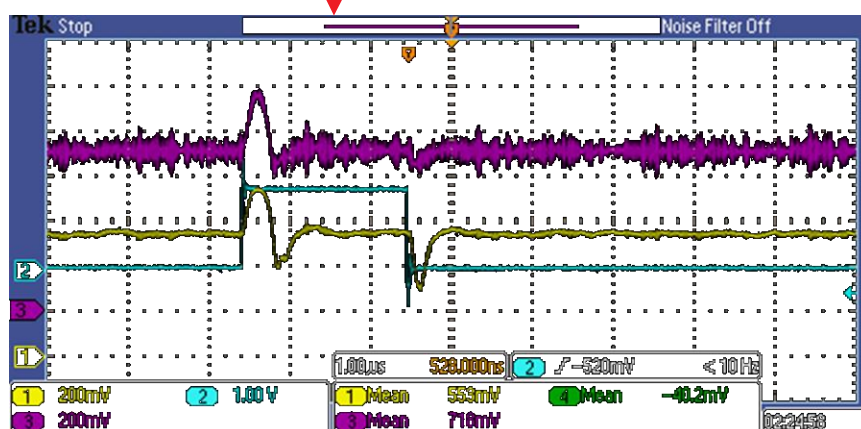
Analog Signal Results

Fig1 Light injection

Fig4 Pulse injection

Fig2 Noise signal

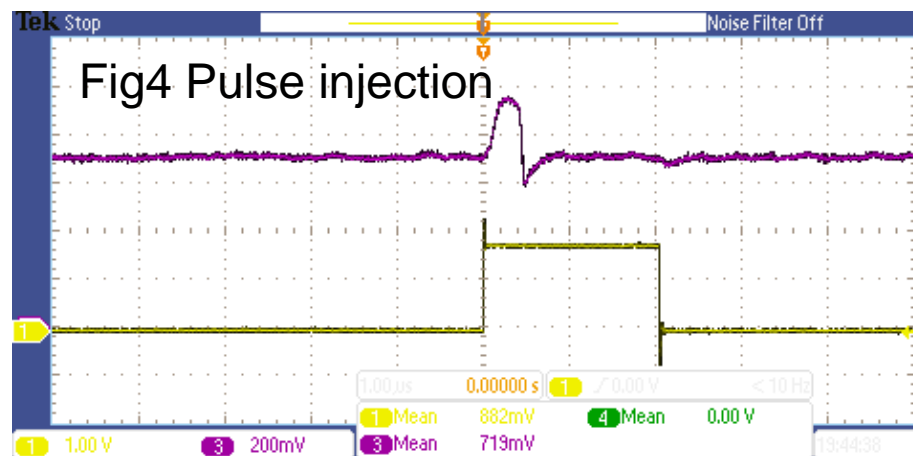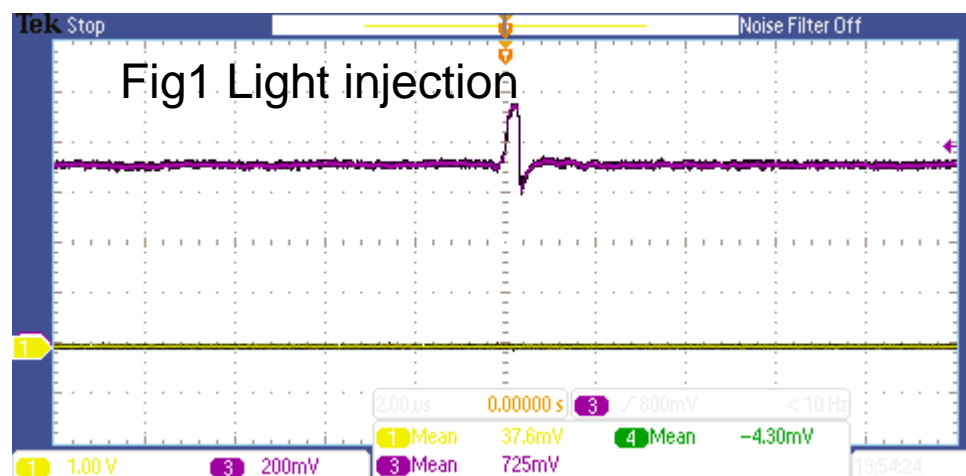
Fig5 Noise signal

Fig3 Noise signal

Fig6 Light injection signal
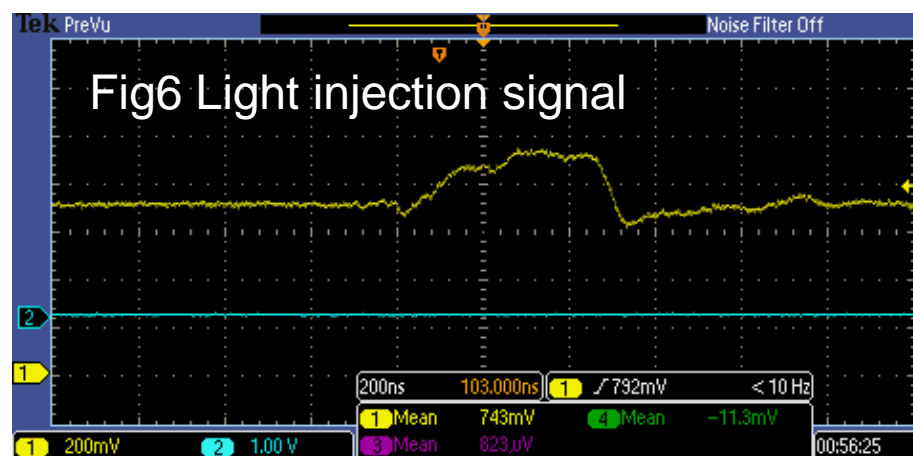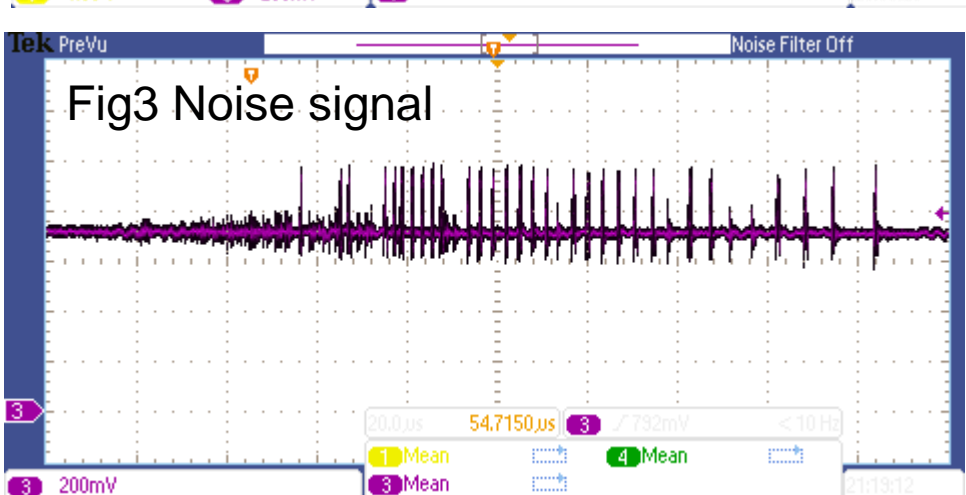

Fig7 Open a hole at the top
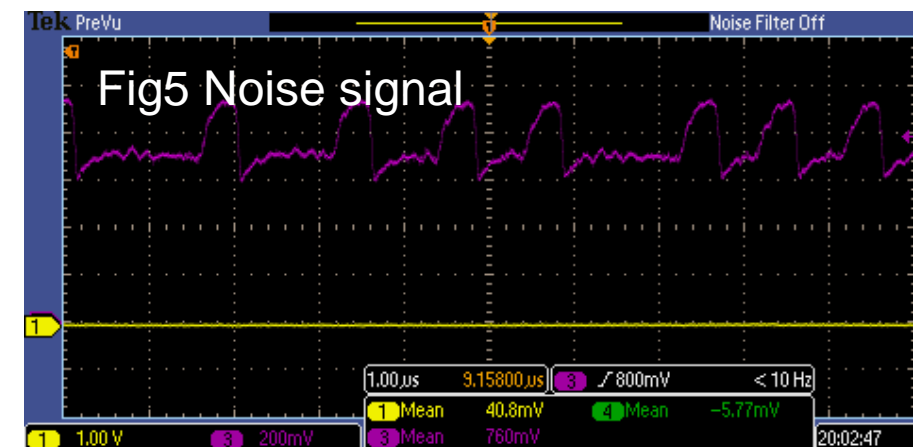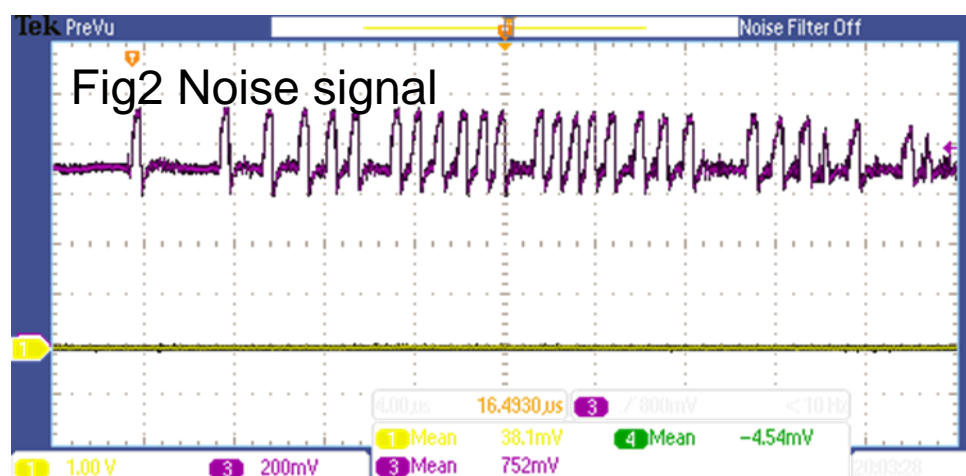
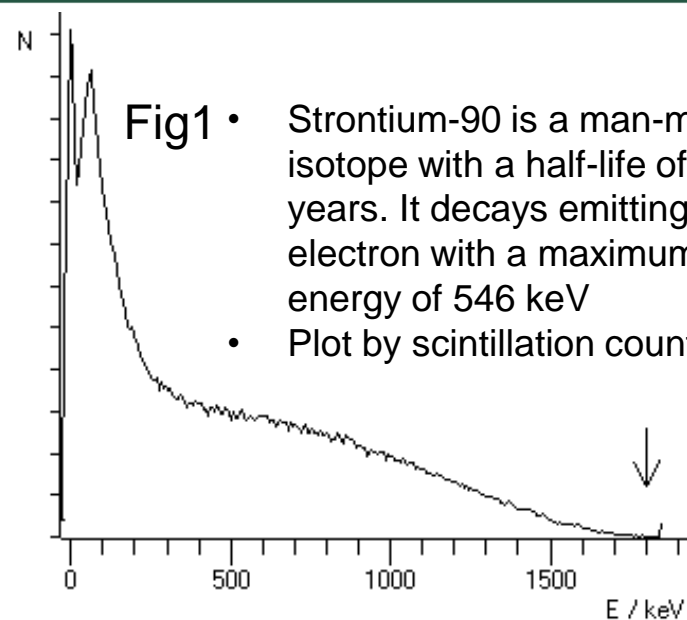Fig8 Button battery on the top

Fig9 Exposed to the Sr90

Fig1 • Strontium-90 is a man-made isotope with a half-life of 28.5 years. It decays emitting an electron with a maximum energy of 546 keV
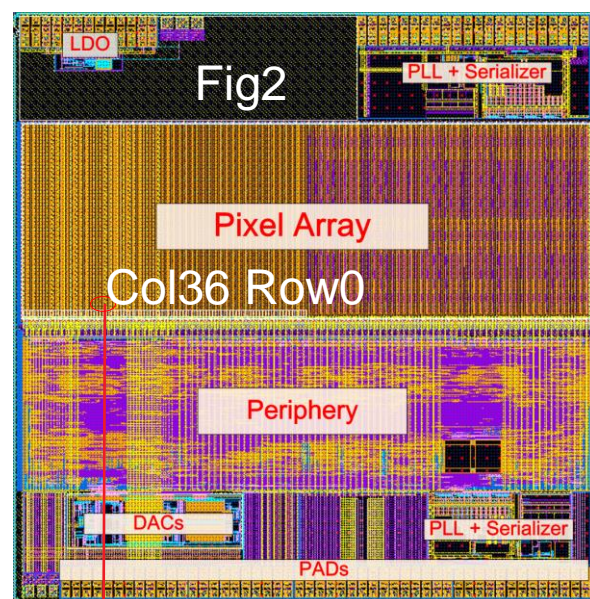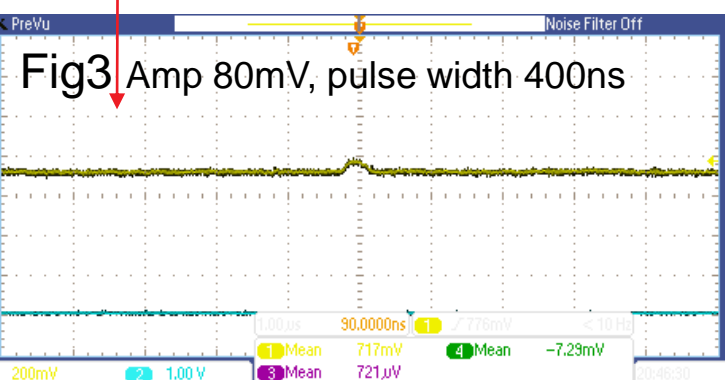• Plot by scintillation counter

Fig2

Pixel Array

Col36 Row0

Periphery

LDO

PLL + Serializer

DACs

PADs

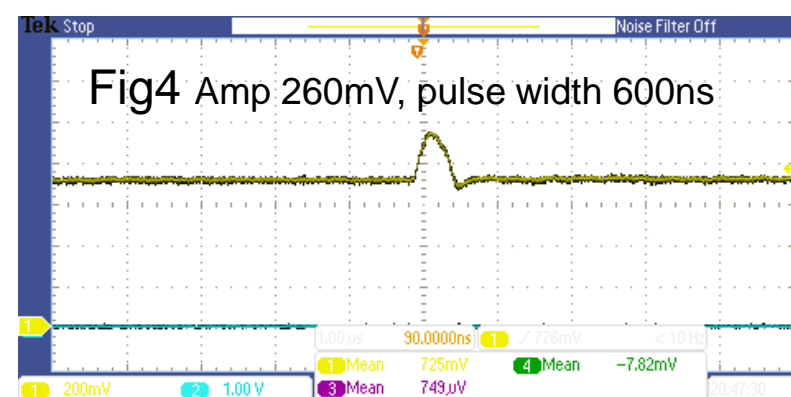PLL + Serializer

Fig3 Amp 80mV, pulse width 400ns

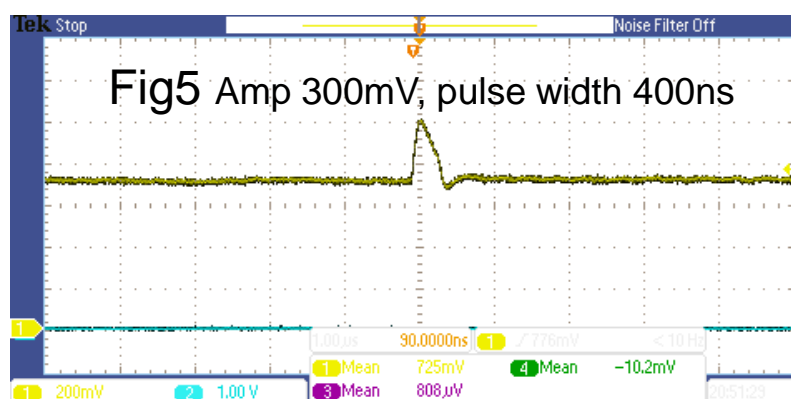**Fig4** Amp 260mV, pulse width 600ns
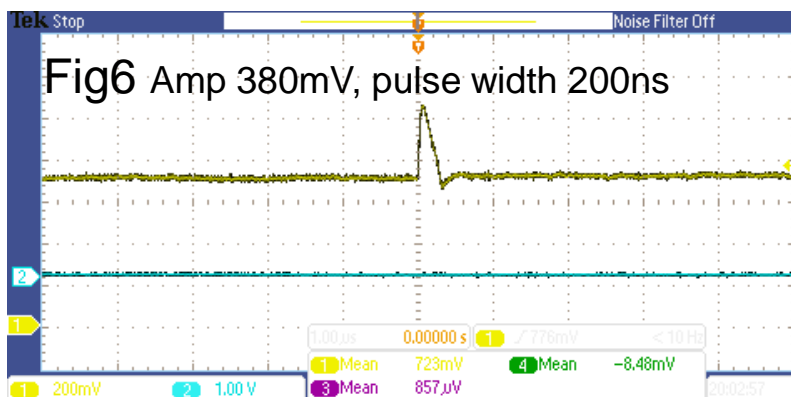
Fig5 Amp 300mV, pulse width 400ns
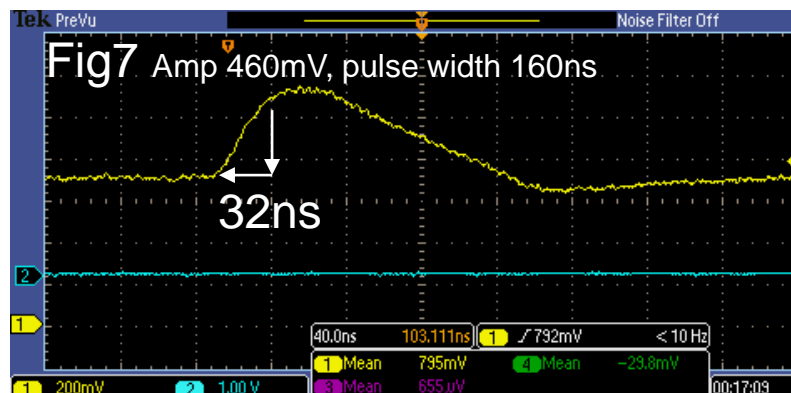
Fig6 Amp 380mV, pulse width 200ns

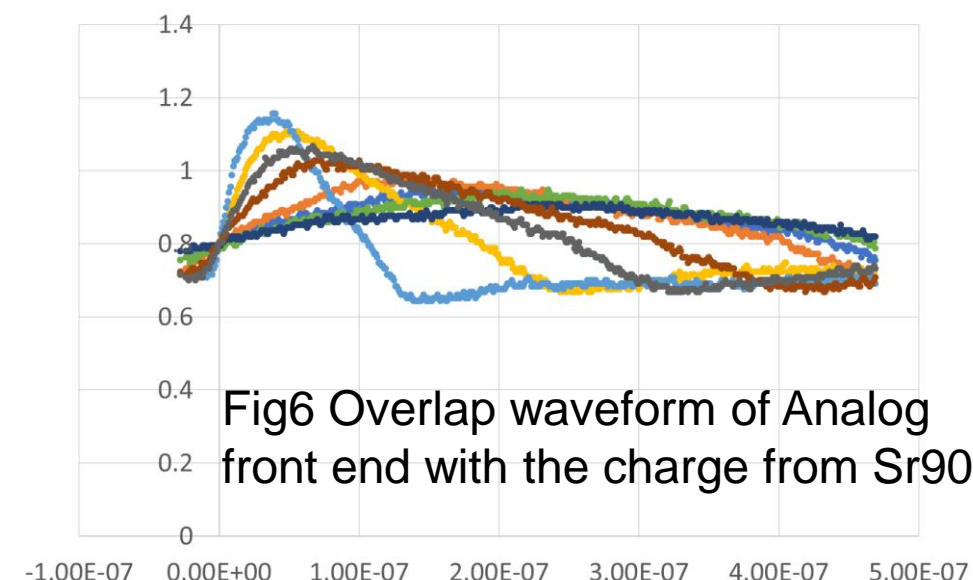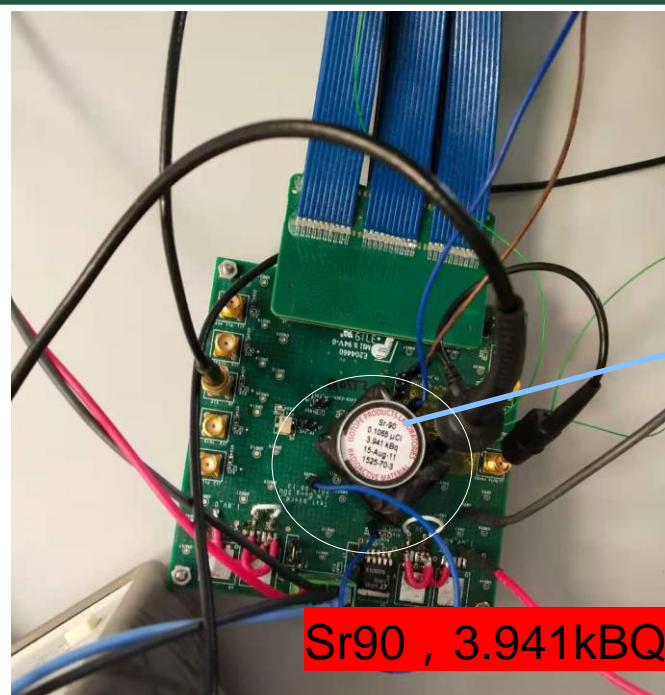**Fig7** Amp 460mV, pulse width 160ns

32ns

Analog OUTA

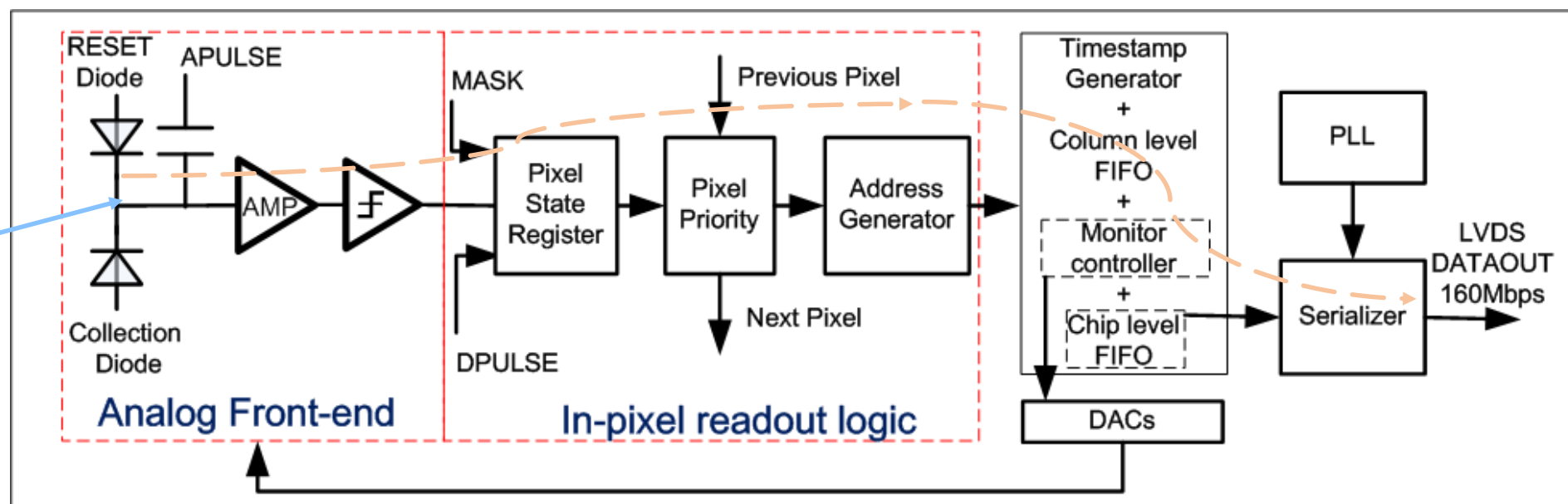Fig6 Overlap waveform of Analog front end with the charge from Sr90

Fig3~ Fig6 show the result of one pixel at the site of (col36,row0) with the Sr90 on the top.

The analog OUTD signal could be detected every **5 mins** on average.

Fig1 test platform for TaichuPix1

Sr90 , 3.941kBQ

TaiChuPix1 Hits

- Fig2 shows the hit map of desk lamp shines to the chip.
- It is working at triggerless mode
- Do a loop data acquisition via Ethernet.
- It throws away the repeating data.
- It shields col62~191 with the MASKING and turn on col0~61.(matrix of 192x64)
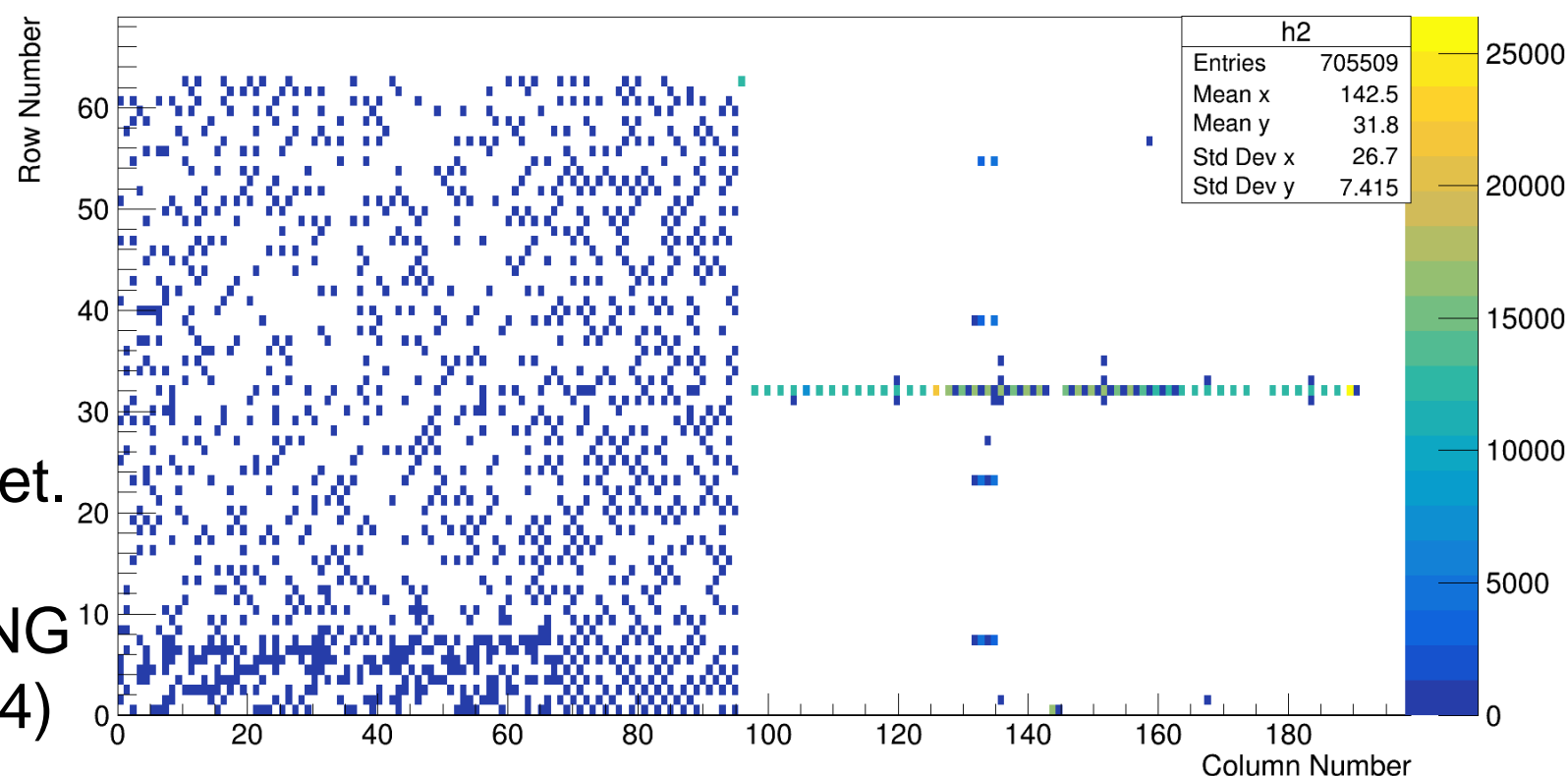

Fig2 LVDS DATA from Sr.90 source
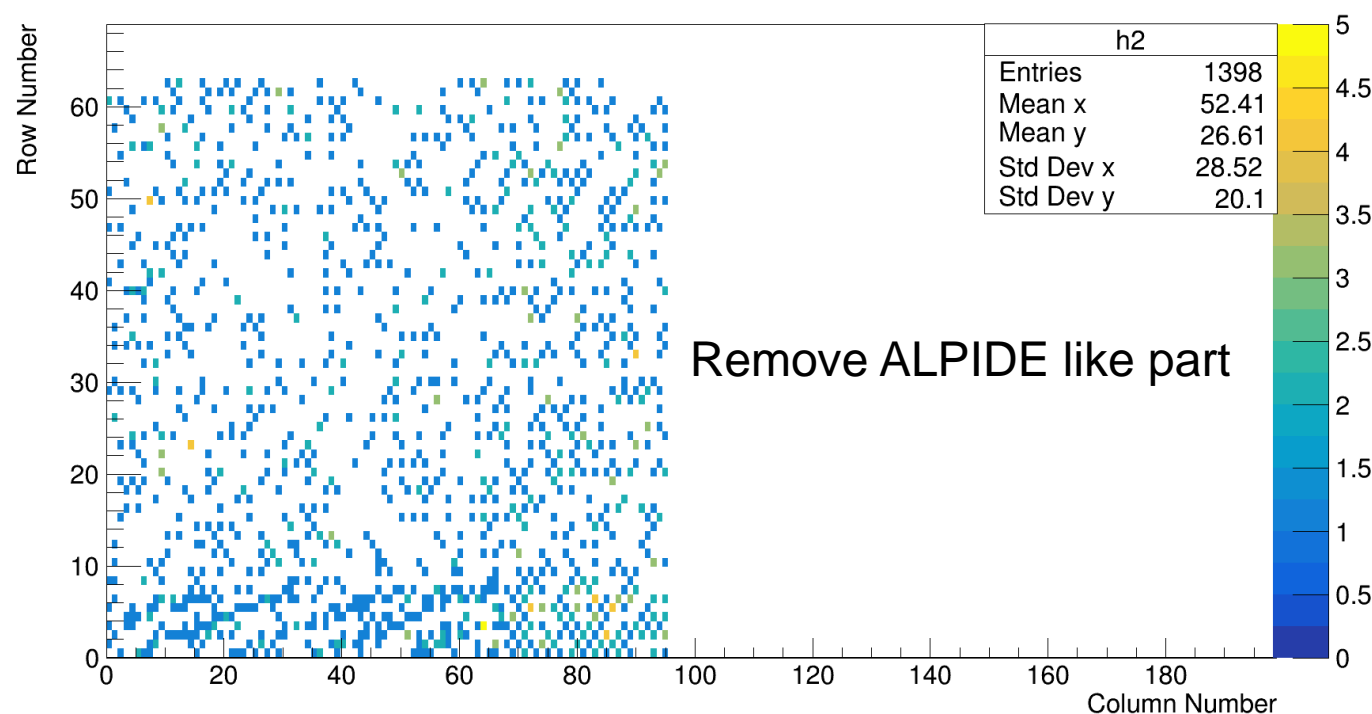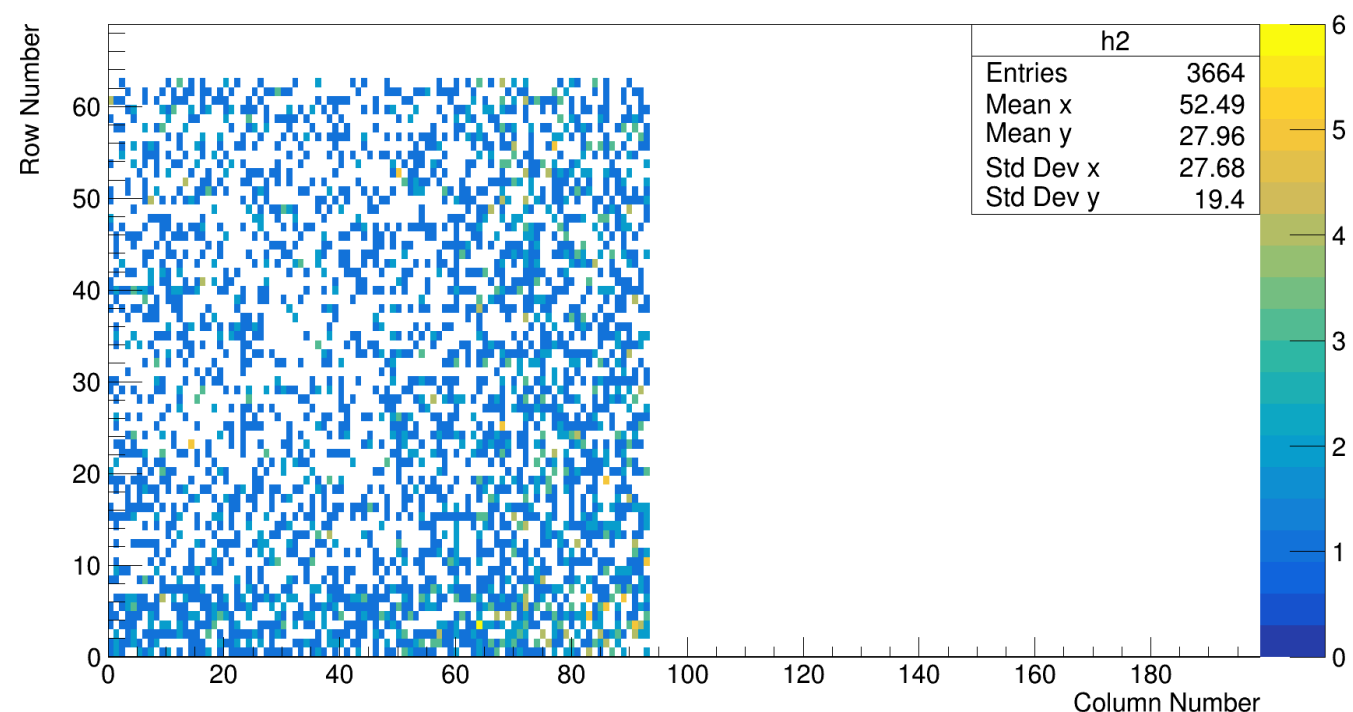
5

LVDS DATA Results

TaiChuPix1 Hits

Remove ALPIDE like part

h2	
Entries	1398
Mean x	52.41
Mean y	26.61
Std Dev x	28.52
Std Dev y	20.1

Fig1 Data shift 5 bits to the left and selected with timestamp>41 and remove Row =32

- Fig1 is optimized from the results of the previous slide, remove most of the invalid data. Only select 1398 valid data from a total of 700K data.
- It is working at triggerless mode, which records all the events from the pixel array, but the speed is not fast enough. It will throw away many hits when the data is too much.
- Do a loop data acquisition via Ethernet. Here are the results of the 30min Sr90 injection.
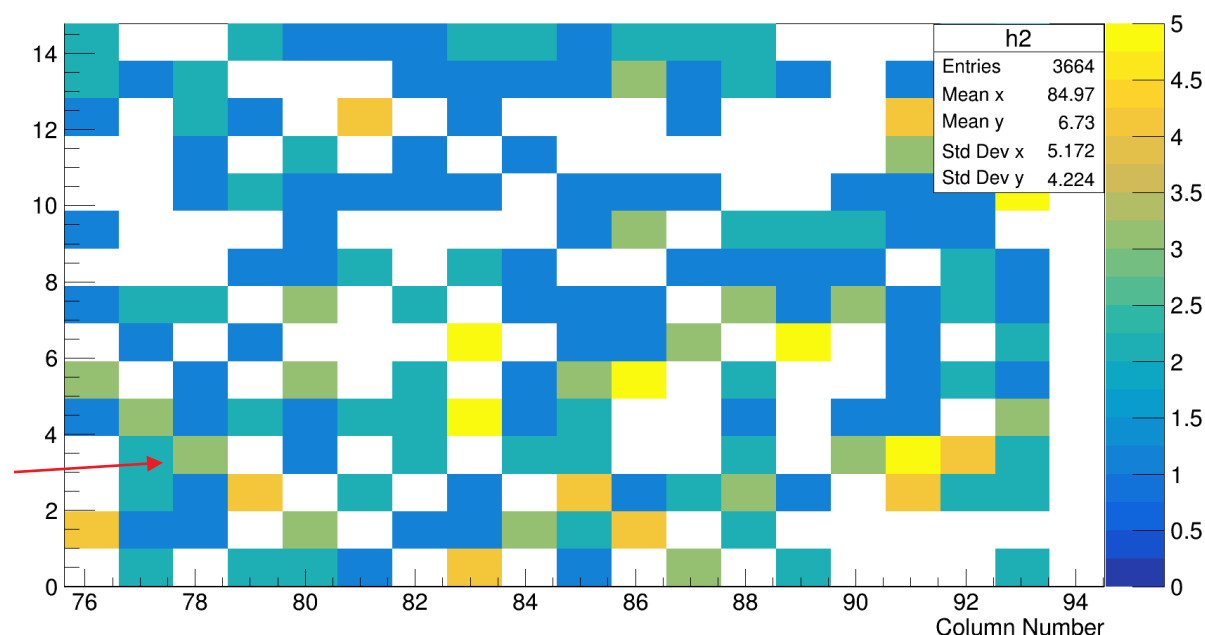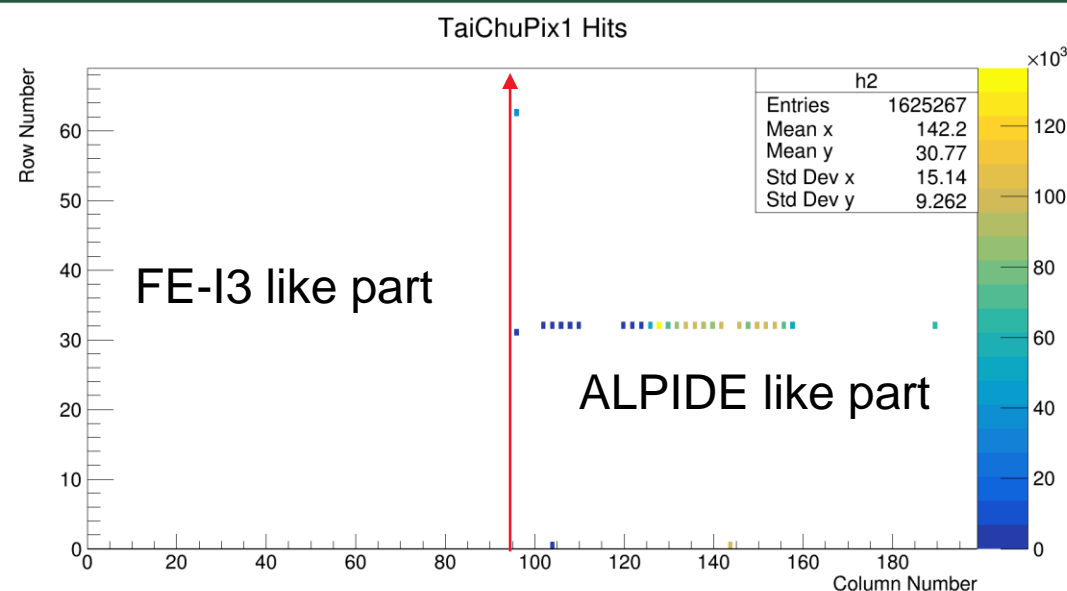
TaiChuPix1 Hits

h2	
Entries	3664
Mean x	52.49
Mean y	27.96
Std Dev x	27.68
Std Dev y	19.4

TaiChuPix1 Hits

h2	
Entries	3664
Mean x	84.97
Mean y	6.73
Std Dev x	5.172
Std Dev y	4.224

Fig3 Zoom in from Fig2

LVDS DATA Results

FE-I3 like part

ALPIDE like part

Fig1 With button battery on the top

Fig2 Triggerless Data selected with 128>timestamp>47

Fig3 Trigger Data selected with 128>timestamp>47
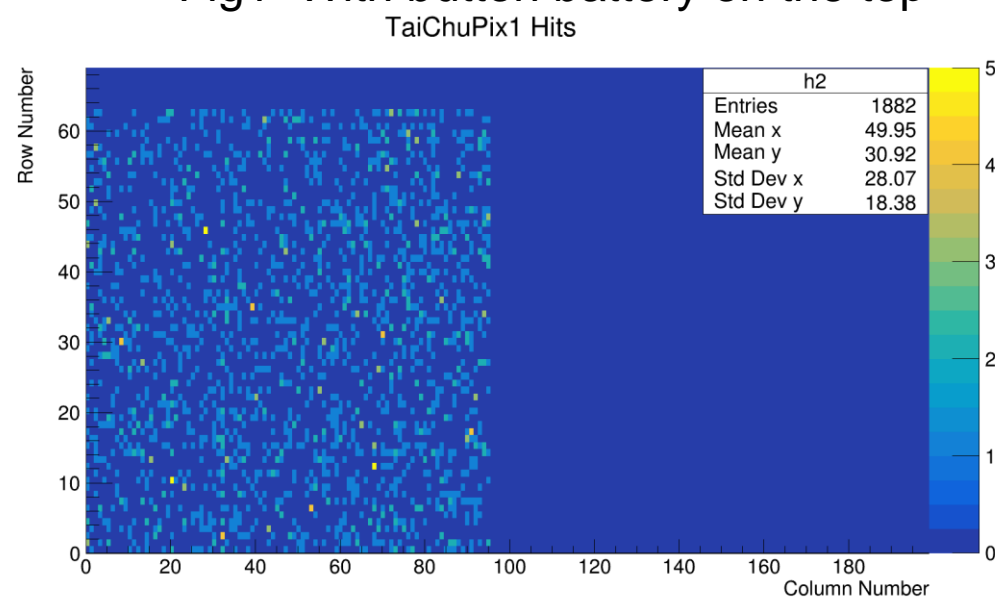

Fig4 All of the triggerless data with errors inside

Fig5 All of the trigger data with errors inside

- I selected the data from a 120MB files.
- Process all of the data, I will find a lot of errors inside.
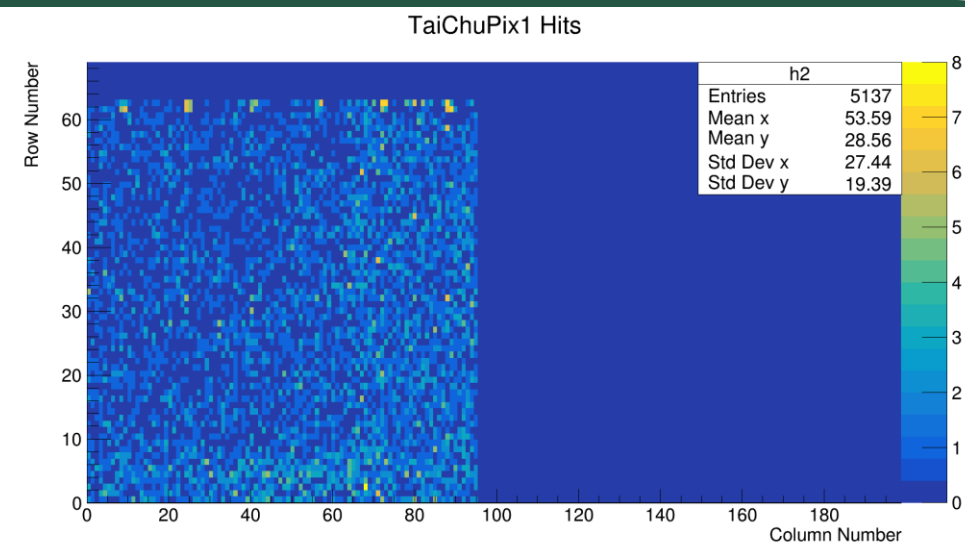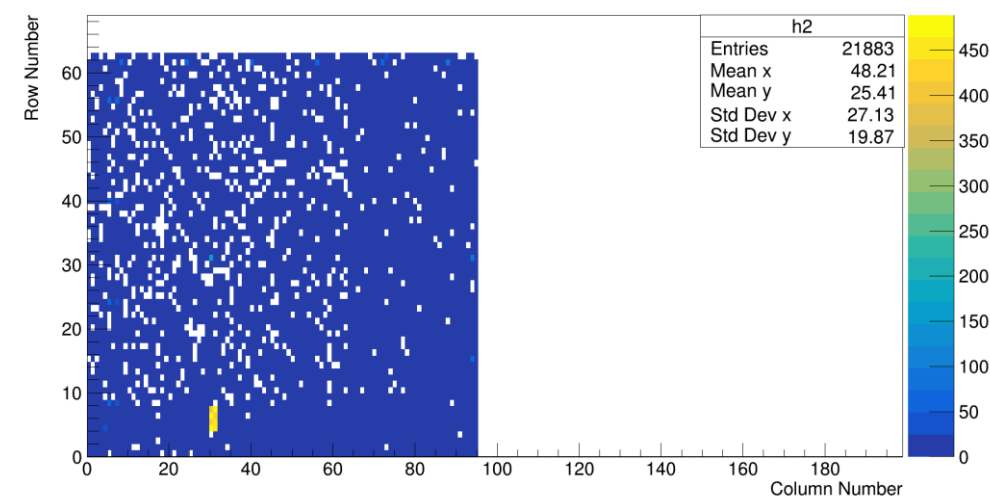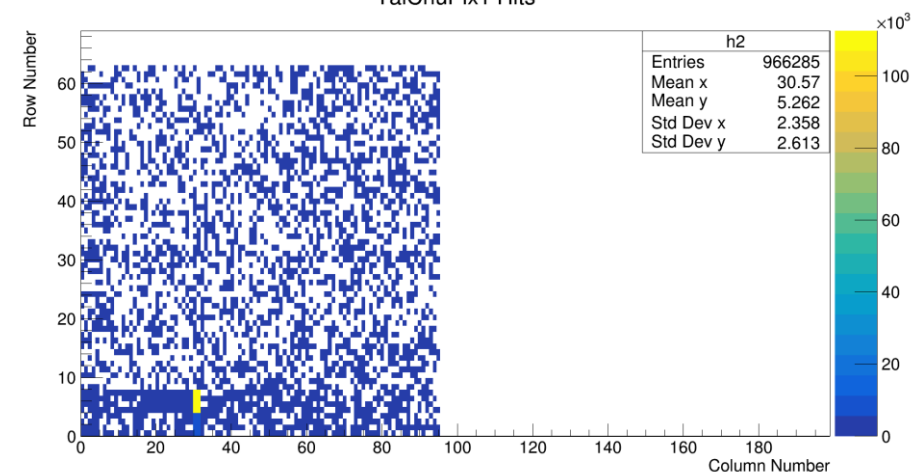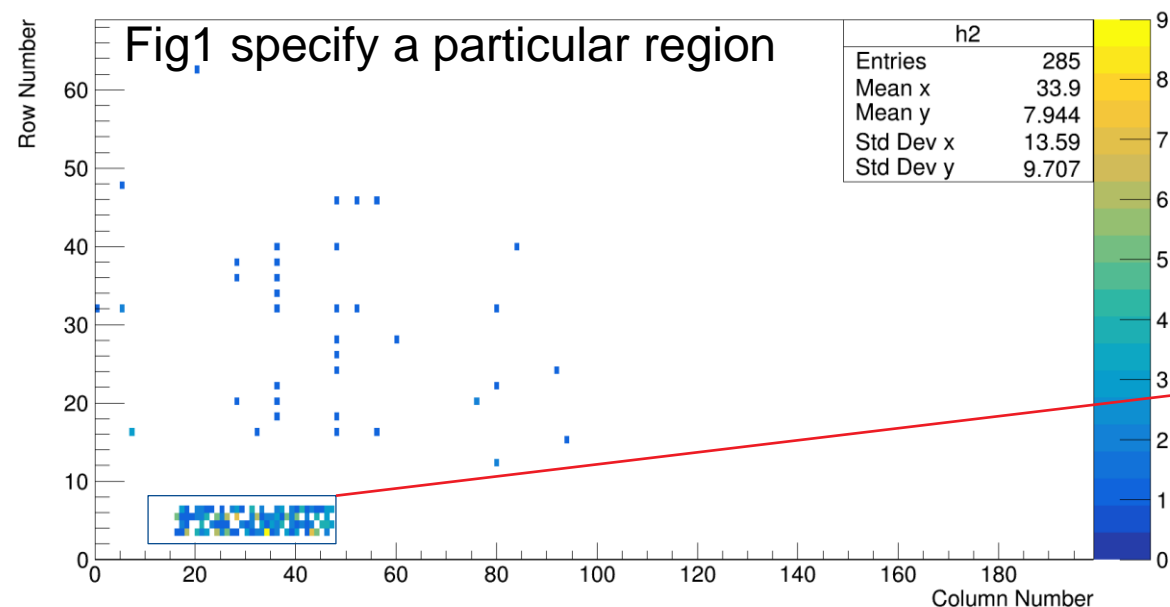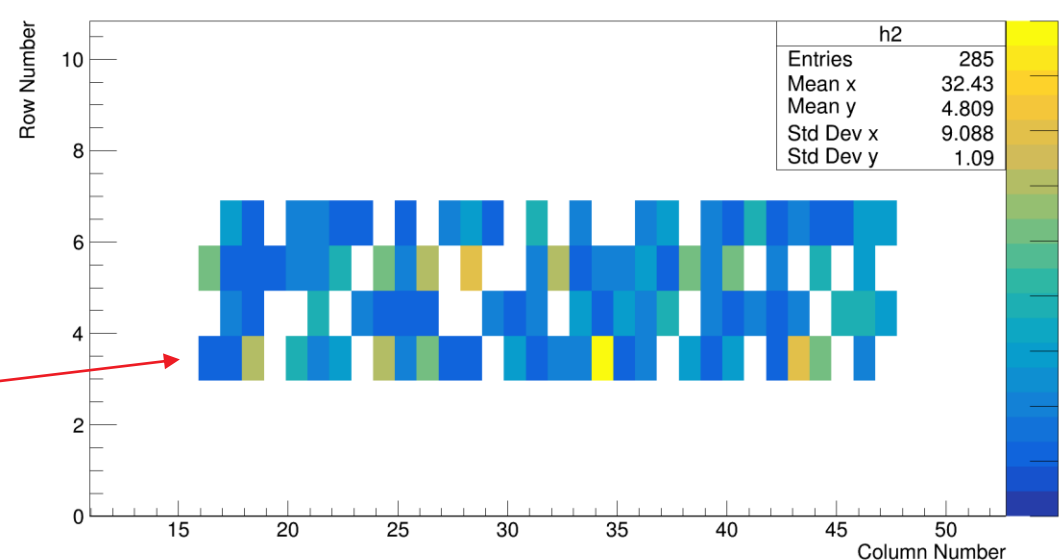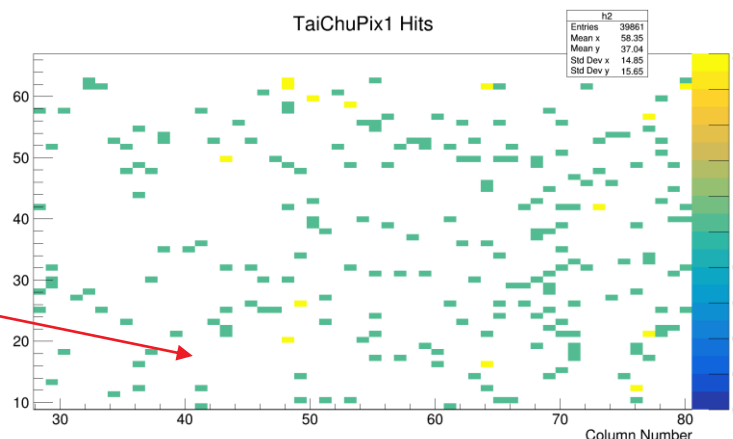- I picked the data with timestamp range [47,128]

Fig1 specify a particular region
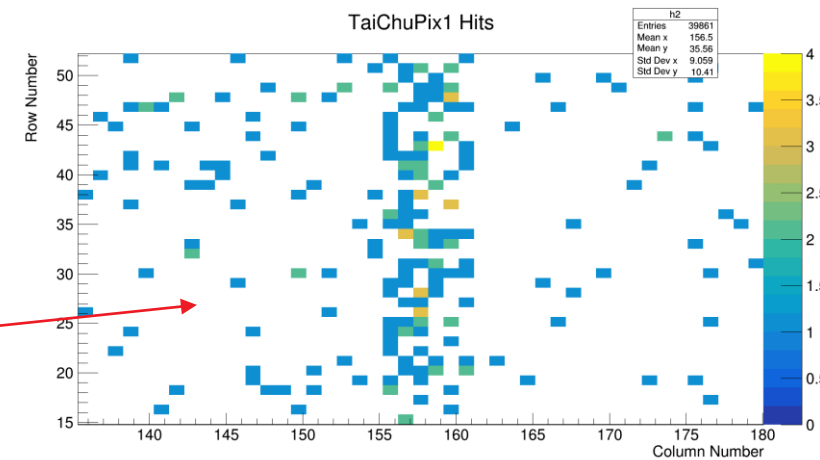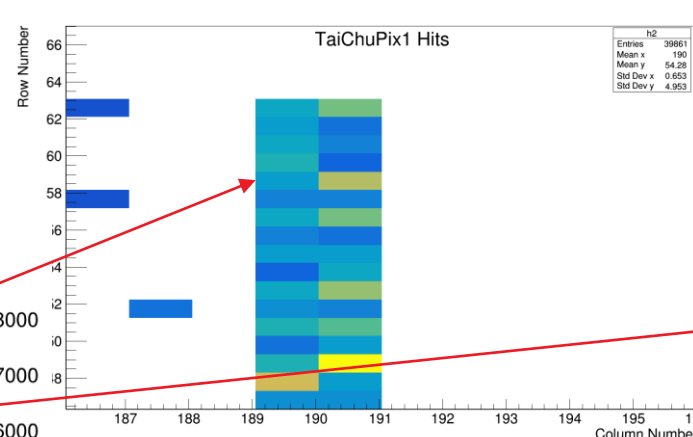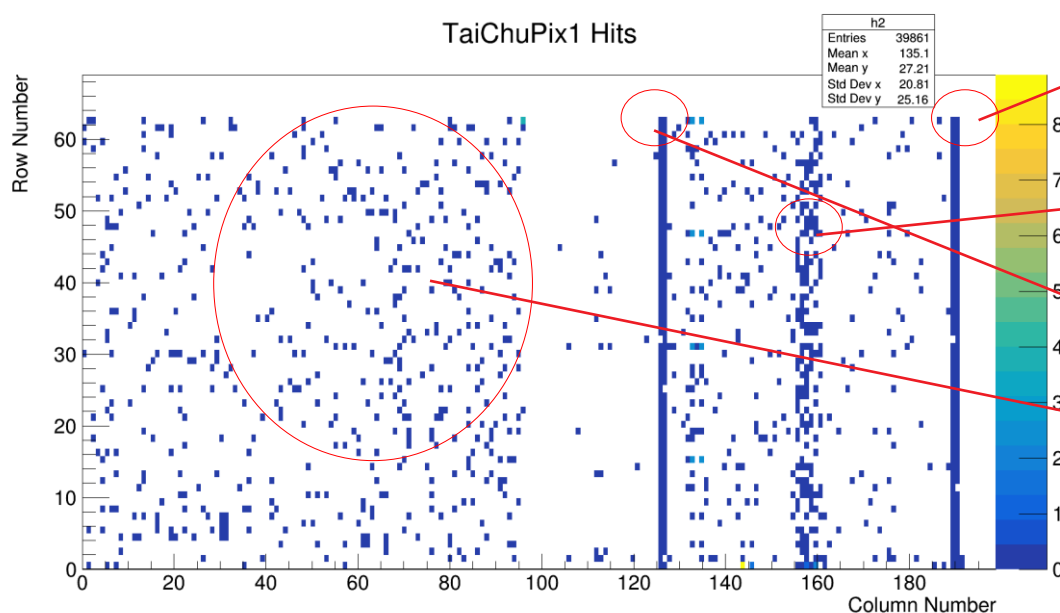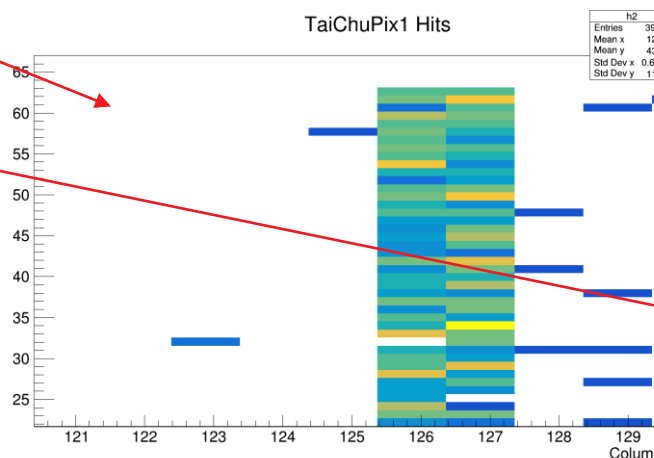
Fig2 turn on all the pixels

Thanks for your attention.