JLC Vertex Detector R&D

Status & Plan

2001 Apr.27
Y. Sugimoto

R&D Items

Spatial Resolution	**Beam Test** **Laser Test**
Radiation Hardness	**^{90}Sr (electron) Irradiation** **^{252}Cf Irradiation** **HE electron Irradiation**
Detector Thickness	**Cooling System** **Thermal Deformation**
Readout Electronics	**Fast Readout (>20MHz)** **Compact PCI FADC for DAQ**

測定概要(1)

YAG laser

spot size　　2x2um

pluse width 10n以下

Prober

走査1um(xy方向)

Temperature　0℃

CCD

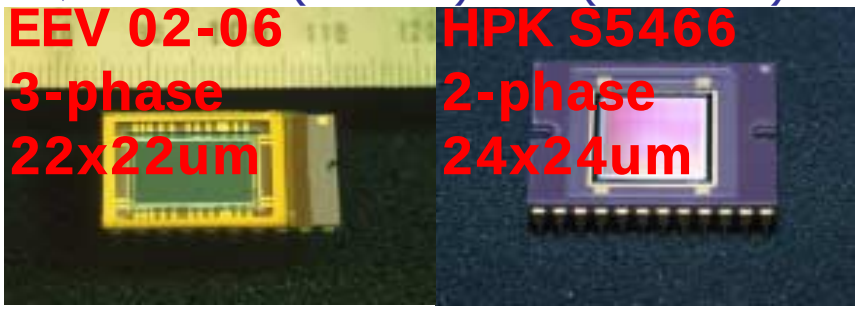
読み出し　　250kpixels/s(HPK,EEV)

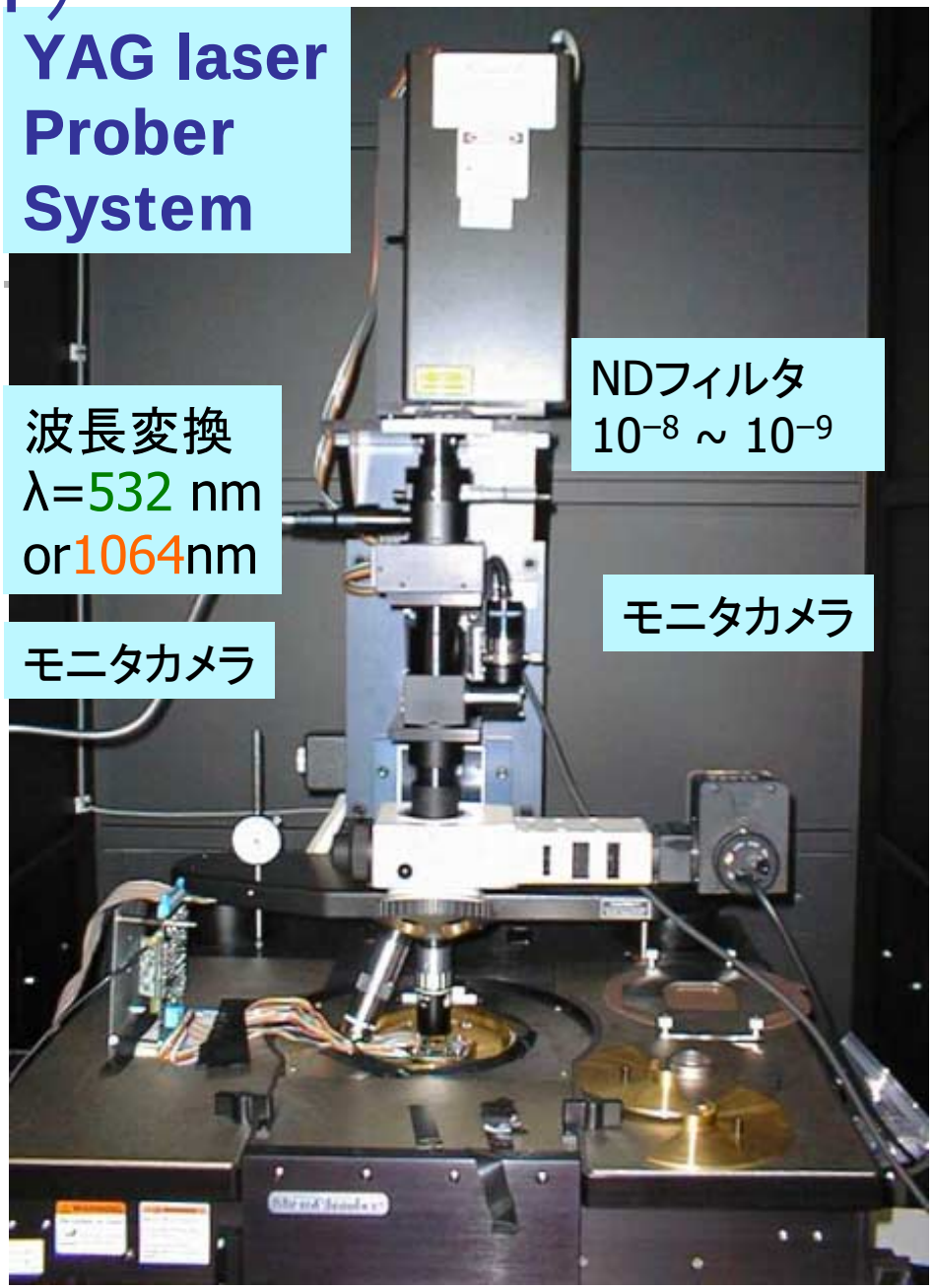
蓄積　　2秒(読み出し時間含む)

フレーム数　100フレーム(各照射点)

gain　　72.5uV/e-(HPK) 34.6uV/e-(EEV)

吸収長　　3um(532nm)1mm(1064nm)



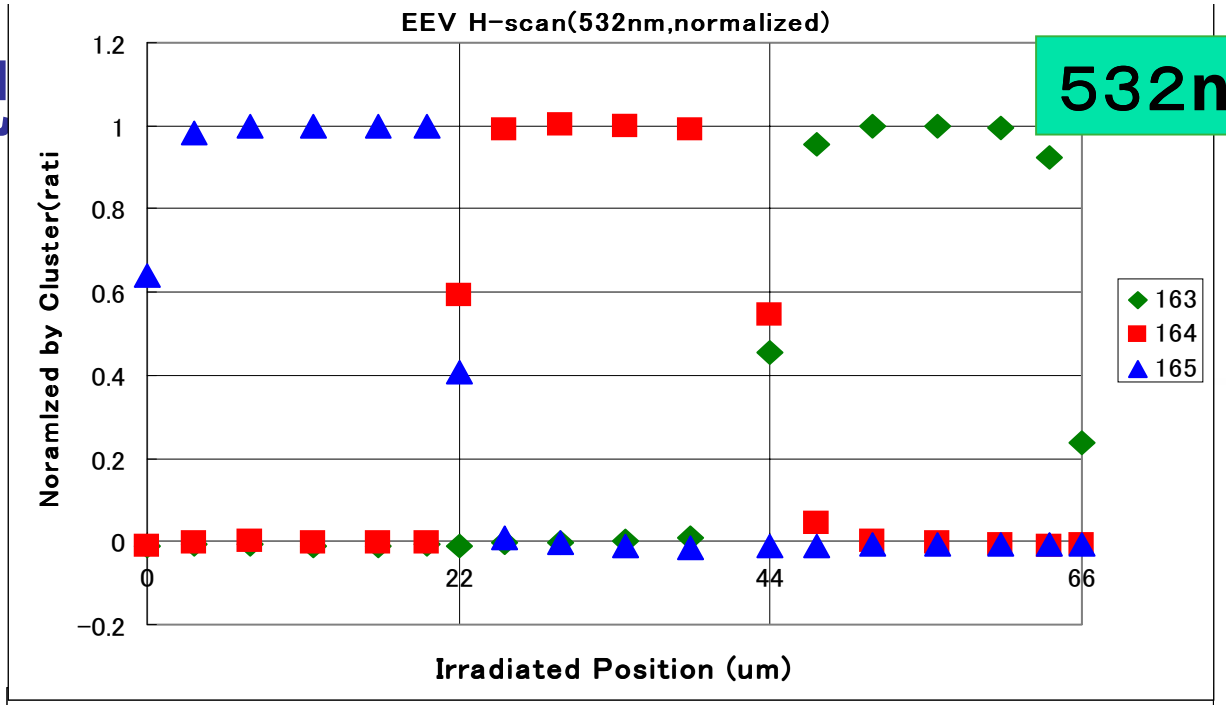


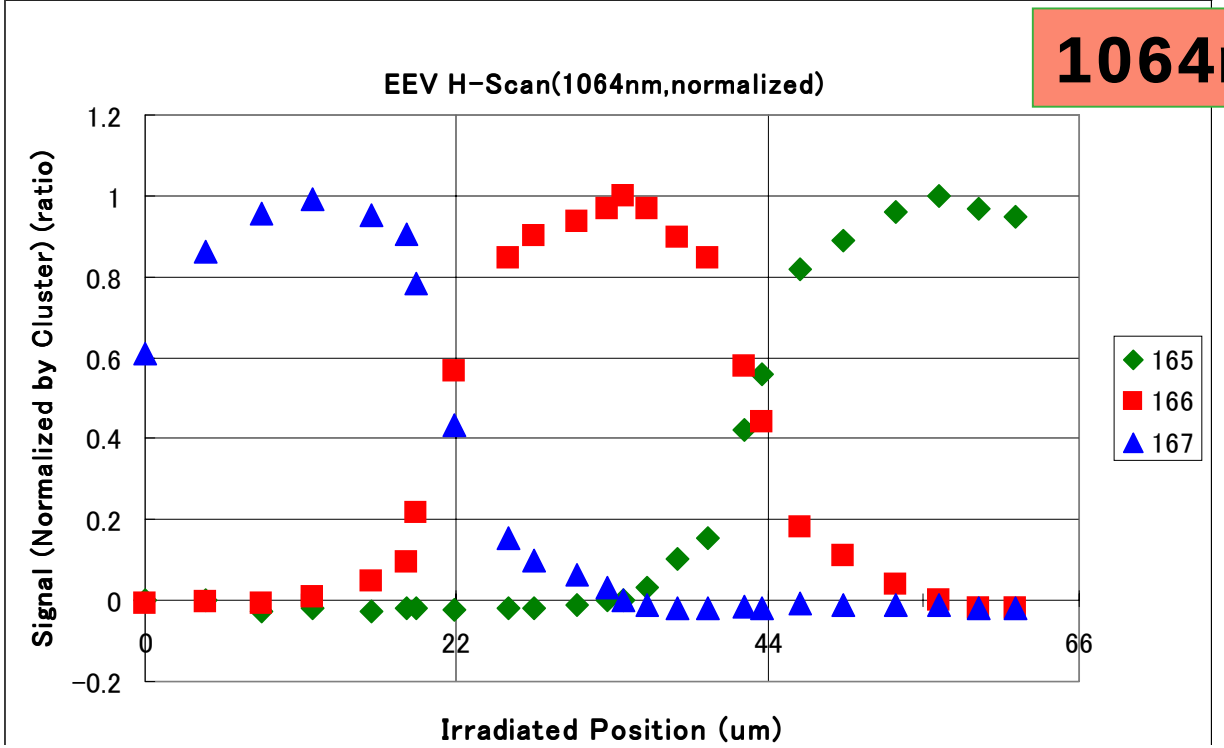
結果電荷分配 H-Scan (EEV)

Normalized by Cluster

Signal Ratio
=Pixel/Cluster
$=P_i/(P_i+P_j)$

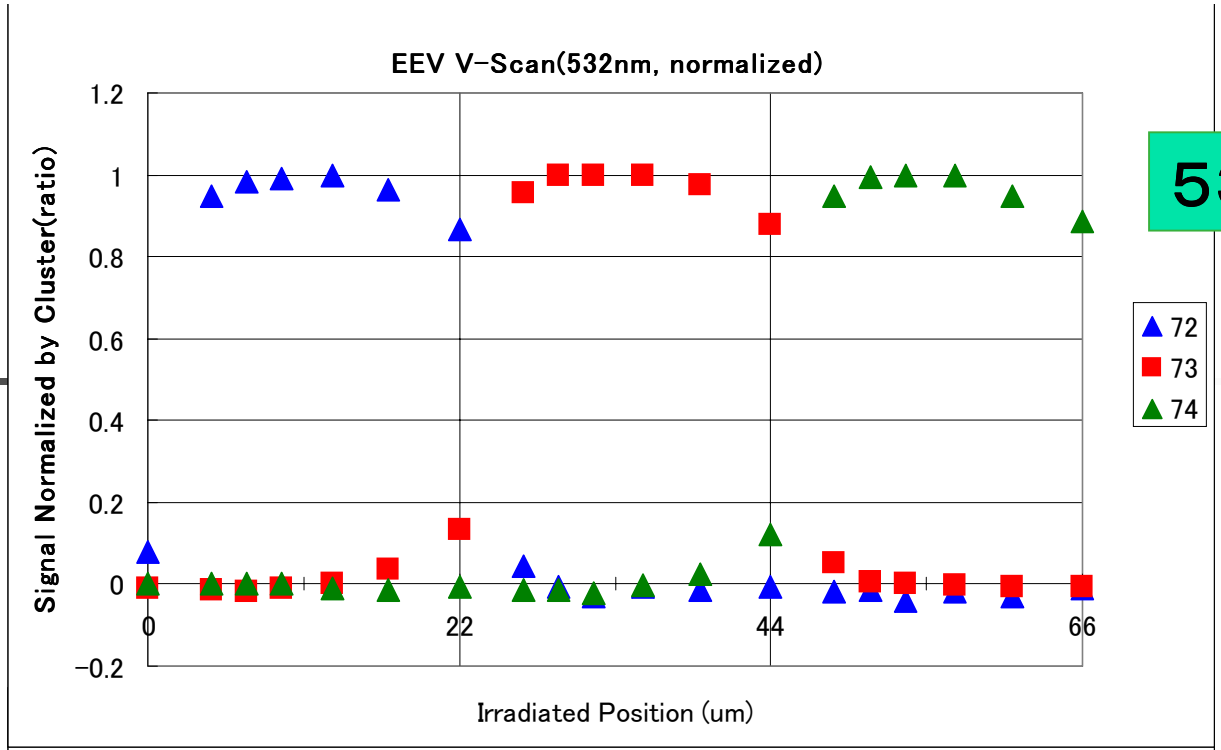
（Gateによる影響を除き、電荷分配のみを取り出す。）



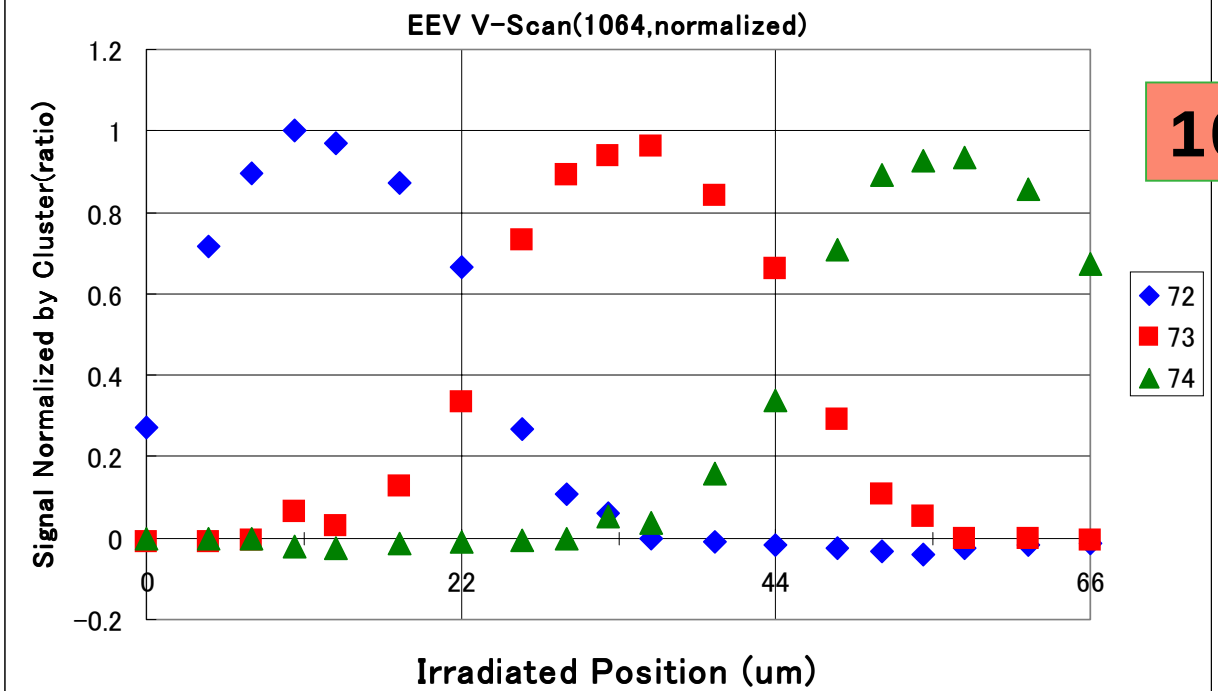


V-Scan (EEV)

Normalized by Cluster



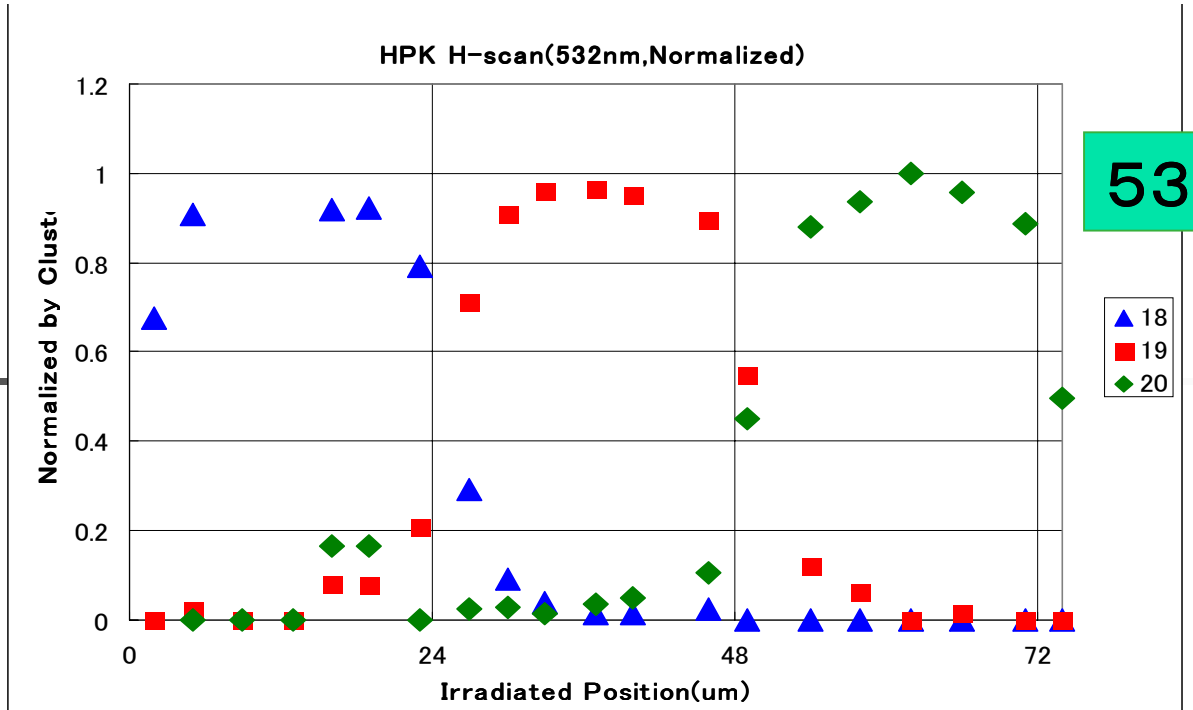
532nm



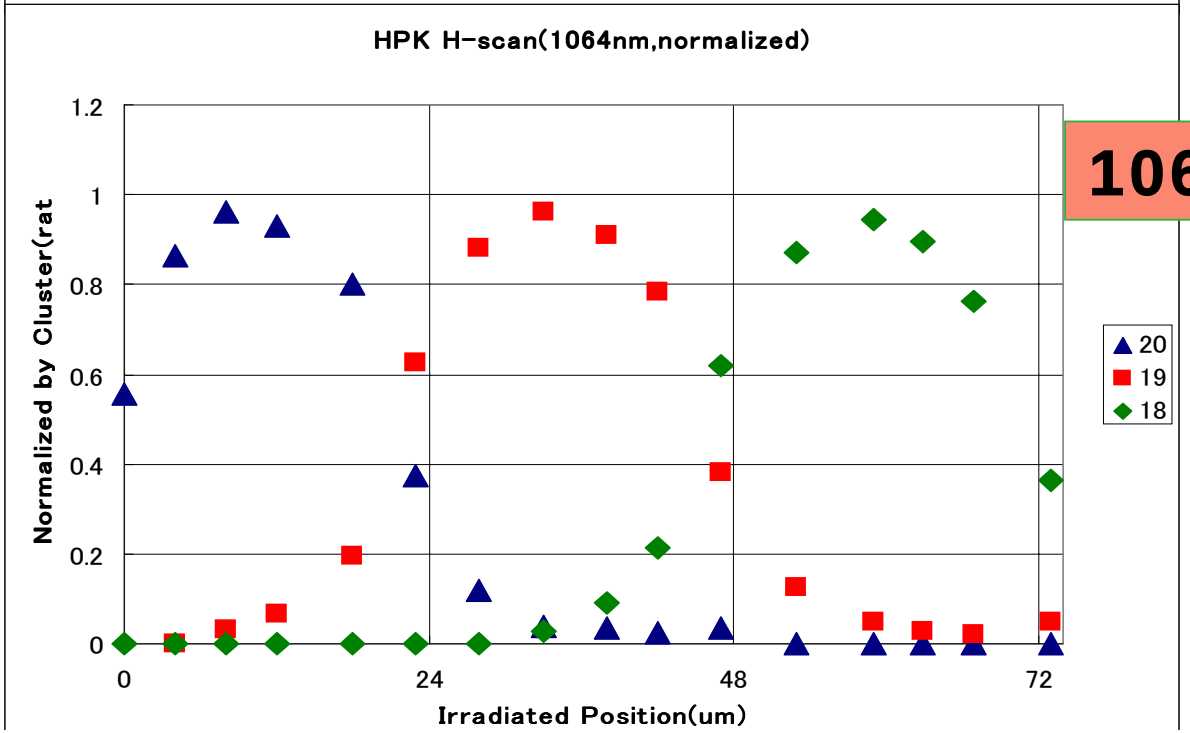
1064nm

H-Scan (HPK)

Normalized by Cluster



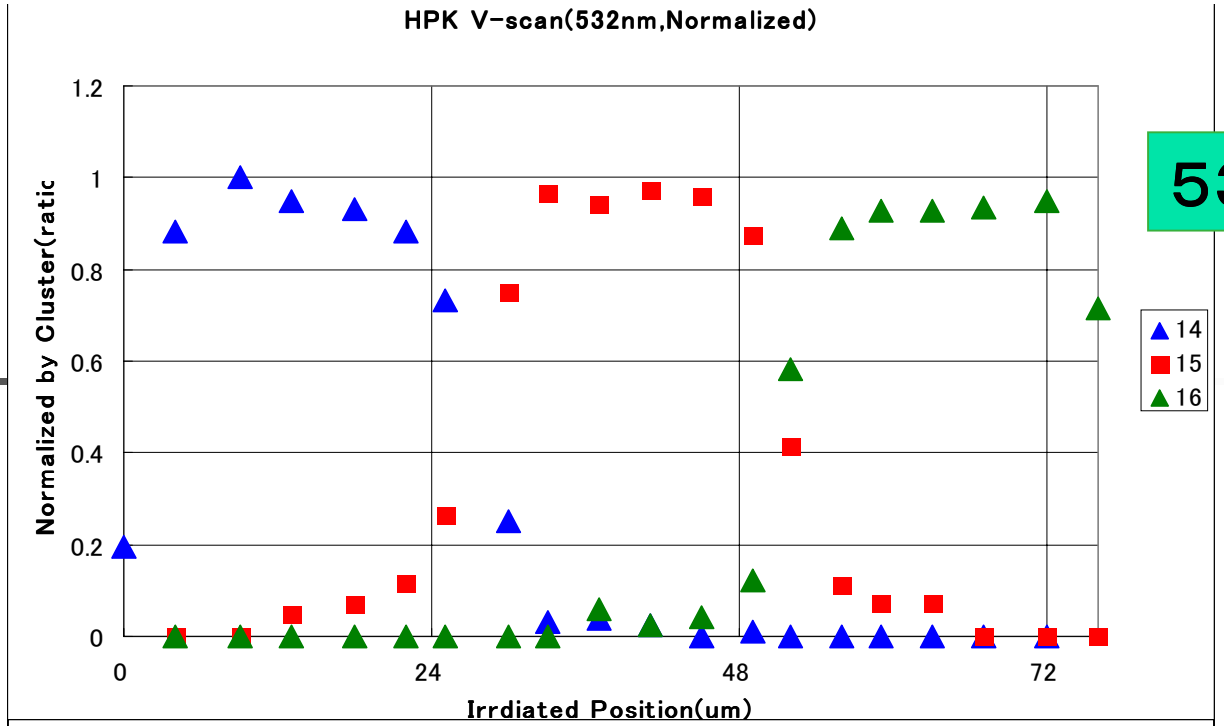
532nm



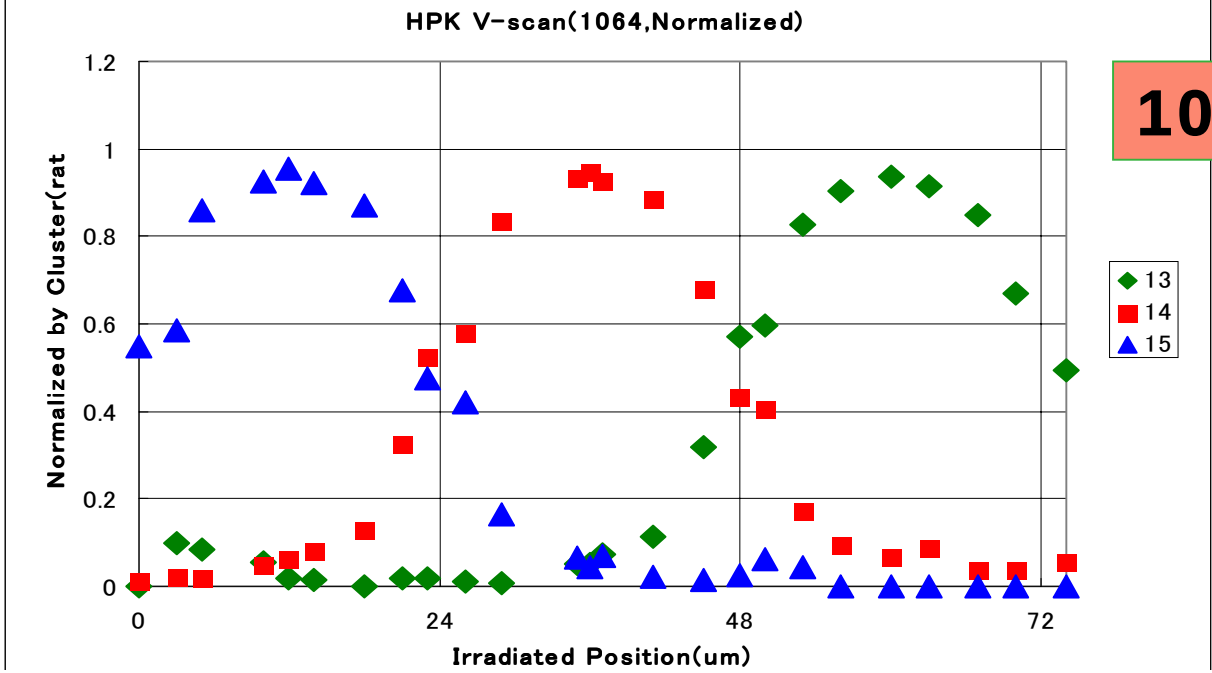
1064nm

V-Scan (HPK)

Normalized by Cluster



532nm



1064nm

位置分解能

CCD type	Scan方向	AC(um)	RLM(um)
EEV(3-phase)	H	3.0	1.4
EEV(3-phase)	V	2.2	2.6
HPK(2-phase)	H	2.1	1.8
HPK(2-phase)	V	1.8	2.1

本実験（レーザー）

σ EEV_H=1.4um

σ EEV_V=2.6um

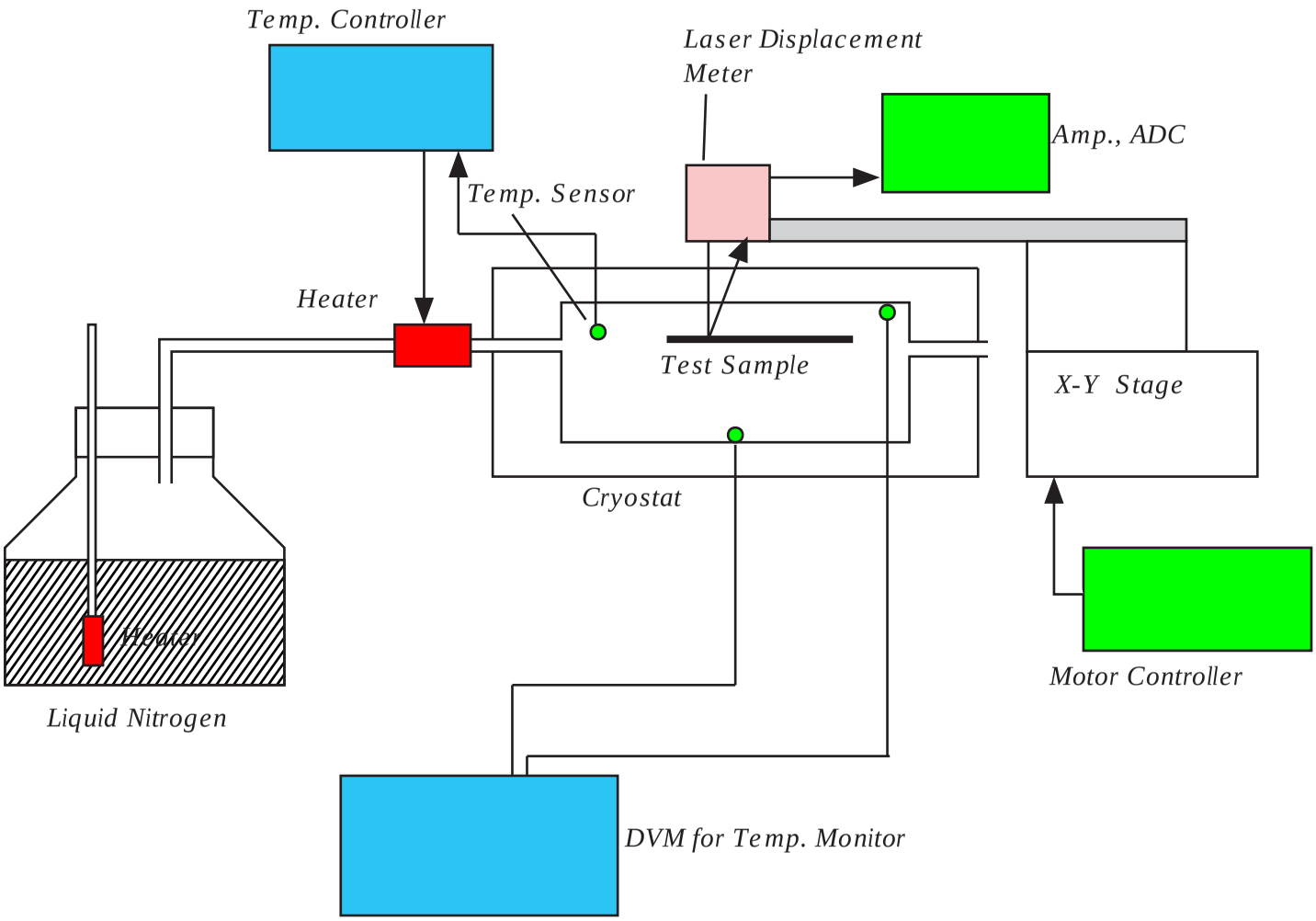
σ HPK_H=1.8um

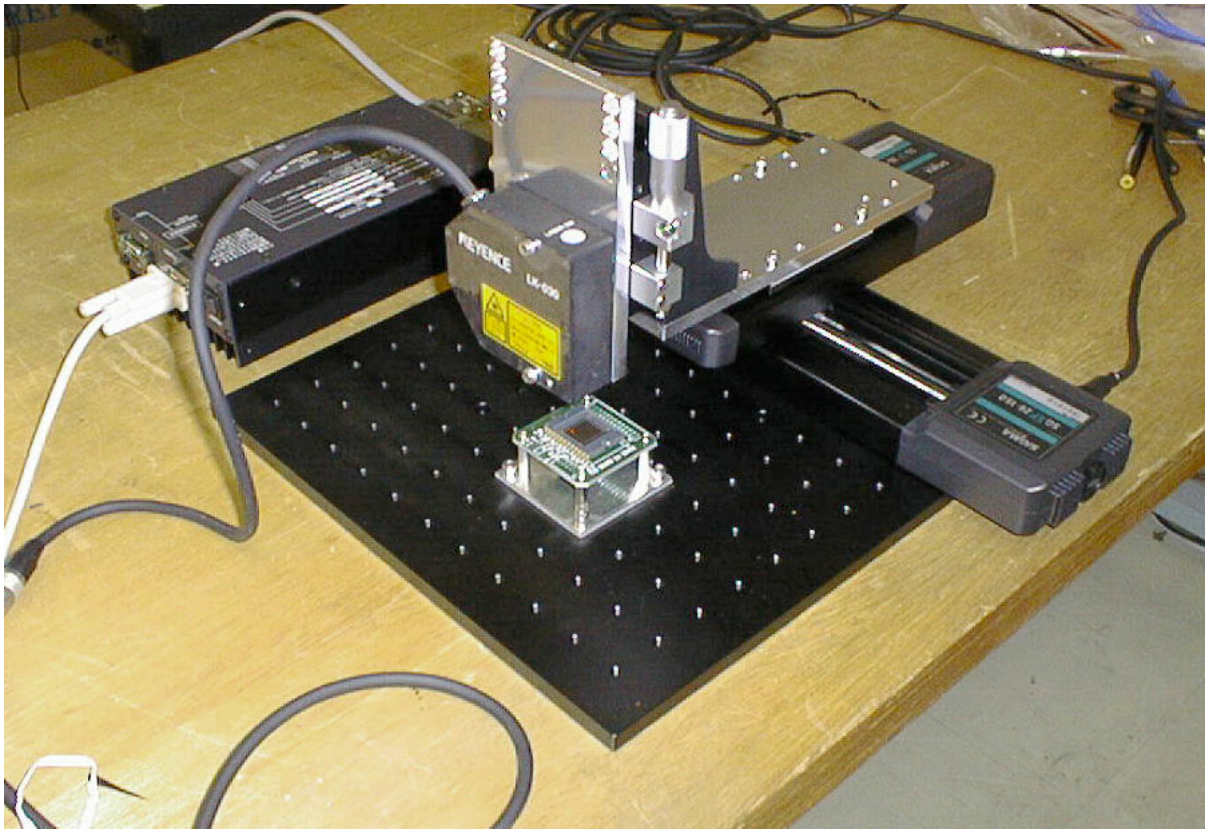
σ HPK_V=2.1um

1998 Beam test

$\sigma_{EEV}=2.94\pm0.23$um

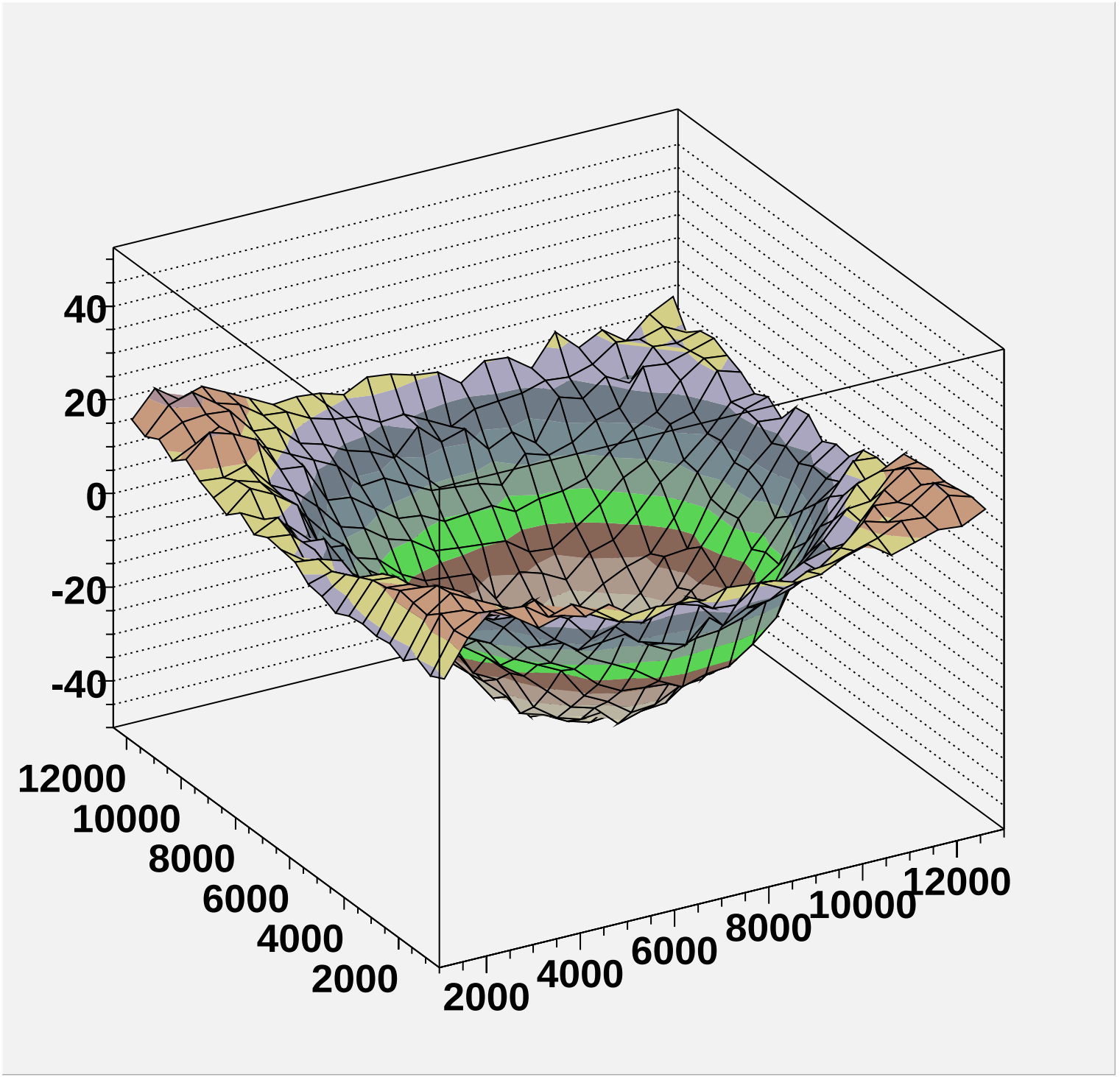
$\sigma_{HPK}=2.47\pm0.65$um





Test setup of X-Y stage and Laser displacement meter

S7170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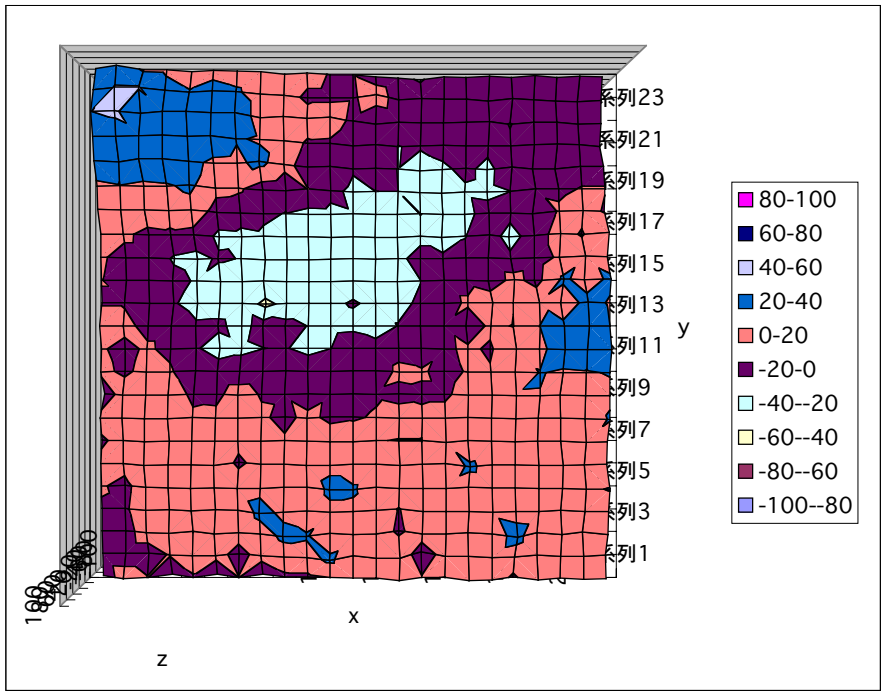
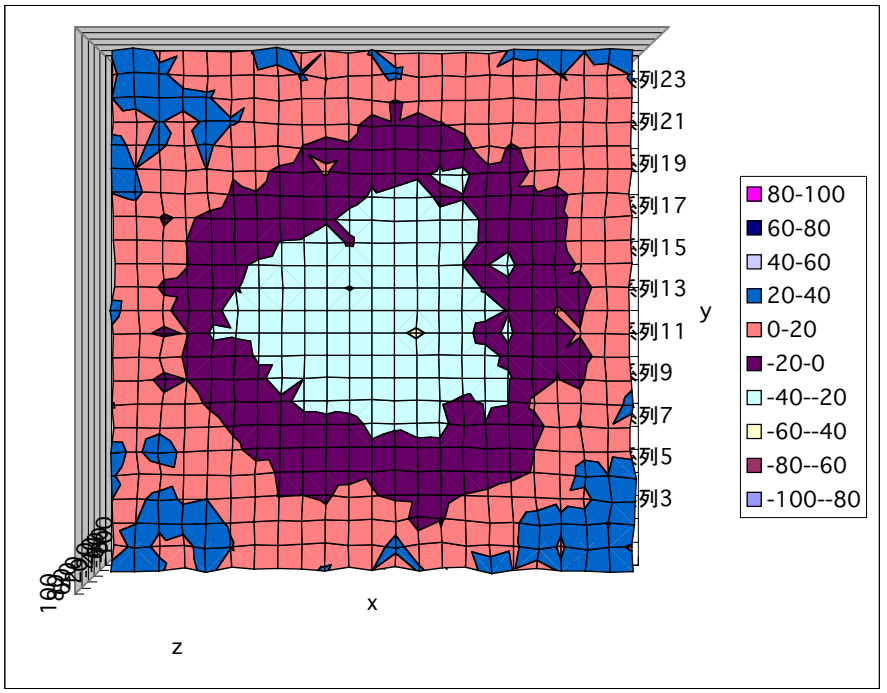
0
-20
-40
12000
10000
8000
6000
4000
2000
2000
4000
6000
8000
10000
12000


列23
列21
列19
列17
列15
列13
列11
列9
列7
列5
列3
列1
y
x
z
80-100
60-80
40-60
20-40
0-20
-20-0
-40--20
-60--40
-80--60
-100--80

-13


列23
列21
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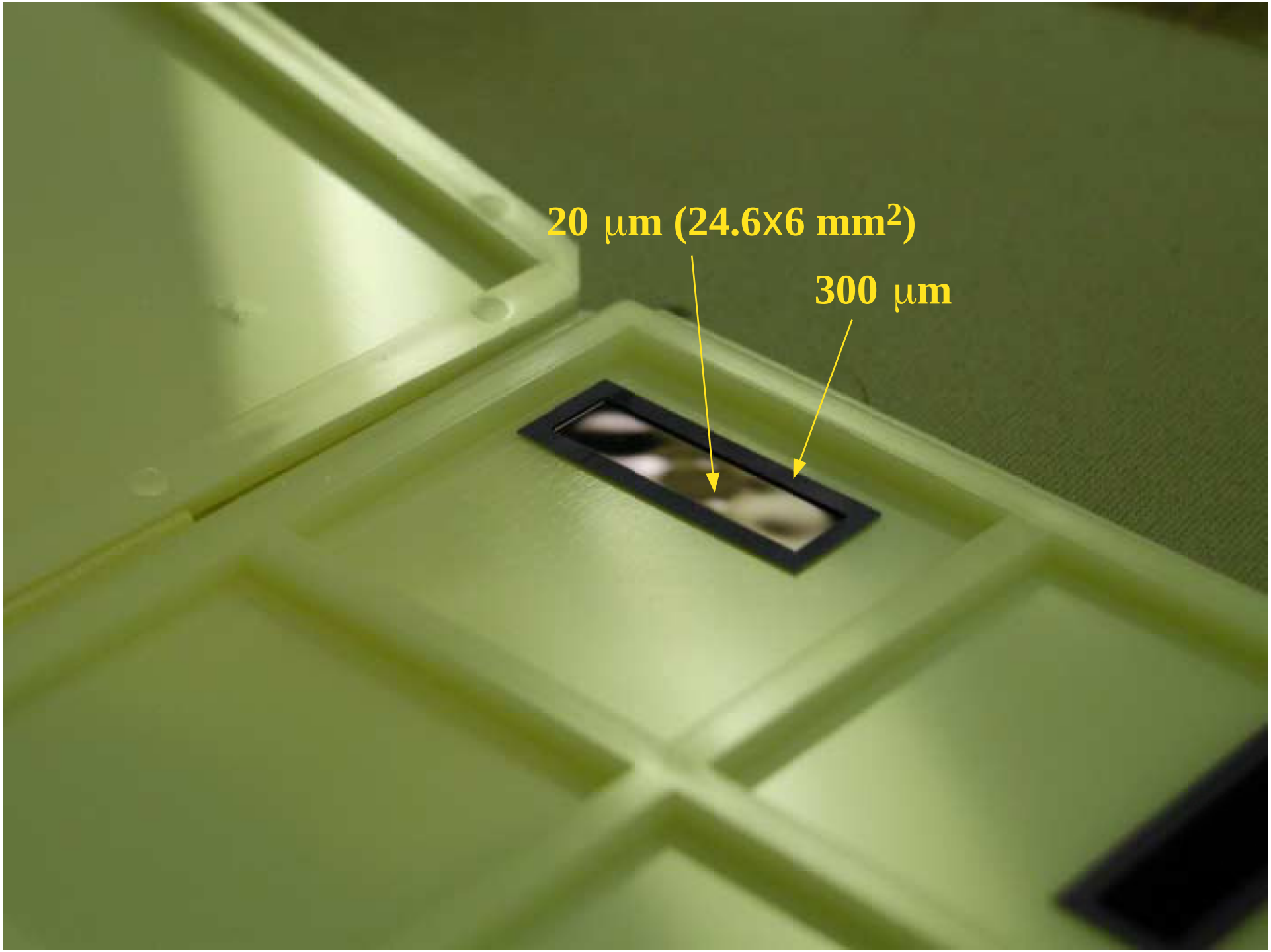
列13
列11
列9
列7
列5
列3
y
x
z
80-100
60-80
40-60
20-40
0-20
-20-0
-40--20
-60--40
-80--60
-100--80

27


20 μm (24.6x6 mm2)
300 μm

Fast Readout

Fast readout is preferable to reduce # of r.o. channel
(2000cm^2=3.2x10^8 pixels, 6 ms r.o. $\Rightarrow$ 53000 ch@1MHz)

Readout speed ~ few MHz - Limited by CCD

New CCD (HPK) ~10 MHz (20 MHz by sparce reset)

Present readout electronics: < 10 MHz

$\Rightarrow$ New electronics needed

Study of S/N, spatial resolution, radiation hardness with high speed readout