

2012-01-19 CSPad CxiDsd alignment

Optical measurement

Run 5 CSPad2-DSD metrology files from Chris Kenney:

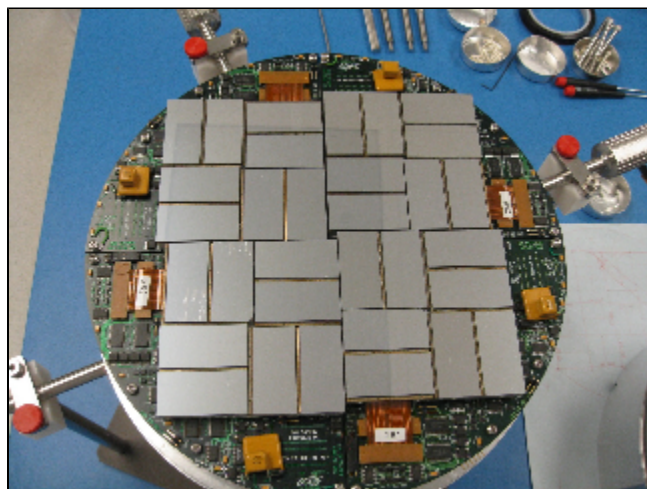
[2012-01-10-CSPAD2-Configuration.pptx](#)

[2012-01-10-Run5-DSD-Metrology.xlsx](#)

[2012-01-10-Run5-DSD-Metrology.txt](#)

[2012-01-12-Run5-DSD-Metrology-corrected.xlsx](#)

[2012-01-12-Run5-DSD-Metrology-corrected.txt](#)



Procedure and table of results

We calculate

S1 - 1st short side of 2x1

S2 - 2nd short side of 2x1

L1 - 1st long side of 2x1

L2 - 2nd long side of 2x1

dS and dL are the deviations of the 1st and 2nd corner along the short and long sides, respectively. The sign of all dS are chosen in order to provide correct sign for the tilt angle (the same direction for all 2x1 sensors).

Everything, excluding $\langle dS/L \rangle$ and angle(deg), are in micrometers.

pair:	S1	S2	dS1	dS2	L1	L2	dL1	dL2	<dS/L>	angle(deg)
Quad 0										
pair: 0	20905	20905	-19	-19	43537	43538	12	13	-0.00044	-0.02500
pair: 1	20906	20900	5	-1	43537	43533	4	0	0.00006	0.00329
pair: 2	20908	20904	-131	-127	43538	43533	-57	-62	-0.00296	-0.16977
pair: 3	20901	20903	-101	-103	43539	43537	-55	-57	-0.00234	-0.13423
pair: 4	20976	20975	-247	-248	43696	43702	113	119	-0.00566	-0.32451
pair: 5	20975	20973	-194	-196	43699	43705	90	96	-0.00446	-0.25566
pair: 6	20904	20901	19	22	43538	43537	14	13	0.00047	0.02698
pair: 7	20909	20910	243	242	43533	43535	117	119	0.00557	0.31916
Quad 1										
pair: 0	20900	20908	-22	-14	43536	43538	9	11	-0.00041	-0.02369
pair: 1	20904	20897	7	0	43539	43534	-2	-7	0.00008	0.00461
pair: 2	20987	20979	180	188	43703	43701	89	87	0.00421	0.24123
pair: 3	20977	20975	50	52	43707	43704	31	28	0.00117	0.06686
pair: 4	21383	21371	-167	-179	43904	43915	78	89	-0.00394	-0.22574
pair: 5	21376	21376	-202	-202	43907	43912	95	100	-0.00460	-0.26358
pair: 6	20894	20906	-121	-133	43540	43540	-57	-57	-0.00292	-0.16712
pair: 7	20909	20896	119	132	43545	43543	61	59	0.00288	0.16513
Quad 2										
pair: 0	20903	20905	-25	-23	43536	43534	13	11	-0.00055	-0.03159
pair: 1	20905	20903	12	10	43541	43541	-4	-4	0.00025	0.01447
pair: 2	20905	20897	0	8	43537	43543	1	7	0.00009	0.00526
pair: 3	20905	20900	250	255	43543	43540	118	115	0.00580	0.33226
pair: 4	21380	21373	-133	-140	43911	43917	66	72	-0.00311	-0.17809
pair: 5	21381	21387	81	87	43906	43904	-41	-43	0.00191	0.10962
pair: 6	20905	20901	-205	-201	43545	43539	-89	-95	-0.00466	-0.26712
pair: 7	20904	20924	-136	-156	43530	43542	-74	-62	-0.00335	-0.19214
Quad 3										
pair: 0	20903	20906	-100	-97	43533	43541	42	50	-0.00226	-0.12963
pair: 1	20900	20900	4	4	43537	43536	-3	-4	0.00009	0.00526
pair: 2	20902	20904	-181	-183	43541	43536	-81	-86	-0.00418	-0.23951
pair: 3	20909	20903	-175	-169	43539	43542	-80	-77	-0.00395	-0.22634
pair: 4	21379	21380	176	177	43906	43917	-91	-80	0.00402	0.23030
pair: 5	21374	21371	65	62	43916	43910	-29	-35	0.00145	0.08285
pair: 6	20904	20906	40	38	43538	43537	22	21	0.00090	0.05132
pair: 7	20902	20895	43	50	43545	43535	30	20	0.00107	0.06119

- All ds1, dl1 are well consistent (within +/-10um) with ds1, dl1, respectively
- Angles of 2x1 are in the range from -0.39 to +0.33 degree.

Configuration parameters

Configuration parameters are shown in number of pixels.

For 2x1 pairs in each quad

Coordinates of the 2x1 centers

- Use the same orientation as in optical measurement, center is calculated as an average of 4 corner coordinates
- All coordinates in pixels

center/0-end.data In pixels:

```
X(pixel):
198.46, 198.05, 311.84, 99.32, 628.17, 629.59, 711.73, 499.58,
198.24, 198.03, 311.37, 98.35, 625.63, 626.78, 711.25, 498.41,
198.16, 198.04, 309.53, 96.76, 626.36, 626.53, 711.73, 499.20,
198.36, 198.02, 309.53, 97.25, 627.67, 627.51, 711.80, 499.15,
Y(pixel):
307.49, 95.11, 626.06, 627.17, 513.15, 725.70, 198.75, 198.39,
307.48, 95.10, 625.67, 625.63, 510.49, 723.25, 196.42, 196.40,
307.77, 95.14, 625.26, 624.72, 513.51, 725.92, 199.69, 200.90,
307.76, 95.09, 627.28, 628.36, 512.75, 725.08, 199.95, 199.96,
Z(pixel):
0.19, 0.22, 0.42, 0.47, 0.25, 0.48, 0.00, 0.17,
0.42, 0.27, 0.57, 0.65, 0.55, 0.82, 0.32, 0.38,
0.05, -0.17, 0.70, 0.50, 0.63, 1.11, 0.20, -0.06,
-0.01, 0.00, -0.12, -0.15, -0.08, -0.09, 0.06, 0.03,
```

center_corr/0-end.data are all zeros

2x1-pair orientation angle (degree) in quads

rotation/0-end.data

```
0 0 270 270 180 180 270 270
0 0 270 270 180 180 270 270
0 0 270 270 180 180 270 270
0 0 270 270 180 180 270 270
```

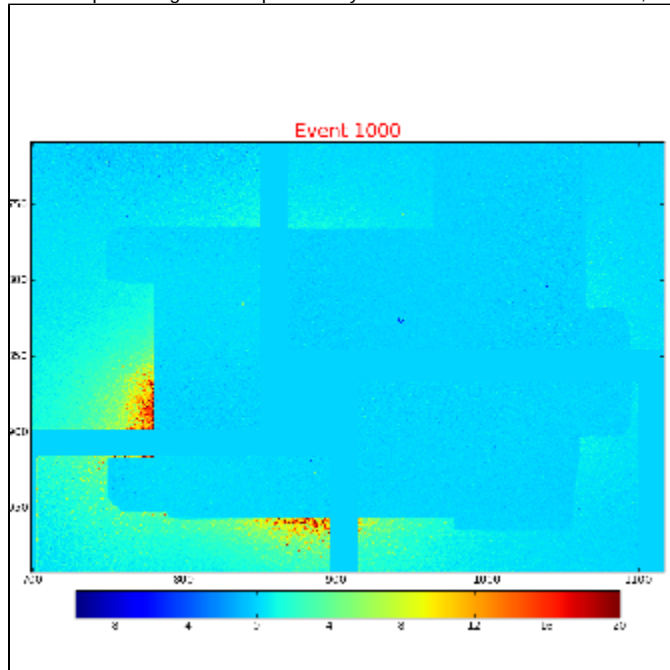
Sensor tilt angle (dergee) from optical measurement

tilt/0-end.data for dPhi:

```
-0.02500 0.00329 -0.16977 -0.13423 -0.32451 -0.25566 0.02698 0.31916
-0.02369 0.00461 0.24123 0.06686 -0.22574 -0.26358 -0.16712 0.16513
-0.03159 0.01447 0.00526 0.33226 -0.17809 0.10962 -0.26712 -0.19214
-0.12963 0.00526 -0.23951 -0.22634 0.23030 0.08285 0.05132 0.06119
```

Quads' alignment

Relative quads' alignment is preliminary done based on cxi80410-r1150, based on DSD image averaged over 1000 events,



where the shadow of mechanical parts can be distinguished. In order to lign-up the boarders of this shadow we apply constants:
marg_gap_shift/0-end.data

```
15 40 0 24
15 40 0 24
0 0 0 0
```

offset_corr/0-end.data

```
1 -3 0 1
1 1 -1 -1
0 0 0 0
```

This image still have two degrees of freedom: X- and Y- gap between quads. Currently we set in marg_gap_shift/0-end.data both gaps to zero.

All other parameters have their nominal values:
offset/0-end.data

```
0 0 834 834
0 834 834 0
0 0 0 0
```

quad_rotation/0-end.data

```
180 90 0 270
```

quad_tilt/0-end.data

```
0 0 0 0
```