

2016-02-05 CSPAD Camera2 Alignment

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Optical measurements

Comments from Gabriel Blaj:

Metrology file for CXI-Camera2-V16-20160205, replacing CXI-Camera2-V16-20150120, for all experiments taking place on or after February 05, 2016. The only changes from the previous version are Quads 0 and 1.

Metrology files:

- [2016-02-05-CSPAD-CXI-Camera2-Metrology.xlsx](#)
- [2016-02-05-CSPAD-CXI-Camera2-Metrology.txt](#)
- [2016-02-05-CSPAD-CXI-Camera2-Metrology-corr.txt](#)

Quality check in X-Y plane

[illegible]

This check for original metrology file shows a few problems with

- Quad 0, segments 4 and 7
- Quad 1, segments 1, 4, and 7

Corrections

Quad 0:

- segment 4: point 18 Y: 67674 -> 67466
- segment 7: point 28 X: 65321 -> 65216

Quad 1:

- segment 1: point 4 X: 43224 -> 43546
- segment 4: point 18 Y: 67604 -> 67816
- segment 7: point 28 Y: 65798 -> 65352

Quality check in X-Y plane for corrected data

[illegible]

Quality check in Z

segm:	SA	LA	XSize	YSize	dZS1	dZS2	dZL1	dZL2	dZSA	dZLA	ddZS	ddZL	dZX	dZY
angXZ(deg)	angYZ(deg)	dz3(um)												
Quad 0														
segm: 0	-20930	43549	43549	20930	-64	-10	-100	-46	-37	-73	-54	-54	-73	-37
-0.09604	-0.10129	54.115												
segm: 1	-20896	43549	43549	20896	-8	51	-55	4	21	-25	-59	-59	-25	21
-0.03289	0.05758	59.013												
segm: 2	-20918	-43549	20918	43549	-25	-4	-15	6	-14	-4	-21	-21	-14	-4
-0.03835	-0.00526	-21.001												
segm: 3	-20942	-43549	20942	43549	50	30	48	28	40	38	20	20	40	38
0.10944	0.05000	19.951												
segm: 4	20910	-43546	43546	20910	28	119	-76	15	73	-30	-91	-91	-30	73
-0.03947	0.20003	91.002												
segm: 5	20913	-43561	43561	20913	33	406	-351	22	219	-164	-373	-373	-164	219
-0.21571	0.59998	373.251												
segm: 6	-20940	-43542	20940	43542	51	53	-125	-123	52	-124	-2	-2	52	-124
0.14228	-0.16317	-1.821												
segm: 7	-20915	-43555	20915	43555	24	37	-39	-26	30	-32	-13	-13	30	-32
0.08218	-0.04210	-12.992												
Quad 1														
segm: 0	-20914	43548	43548	20914	-116	41	-41	116	-37	37	-157	-157	37	-37
0.04868	-0.10136	156.978												
segm: 1	-20916	43547	43547	20916	23	48	75	100	35	87	-25	-25	87	35
0.11447	0.09588	24.999												
segm: 2	-20931	-43554	20931	43554	-24	-9	172	187	-16	179	-15	-15	-16	179
-0.04380	0.23548	-15.112												
segm: 3	-20934	-43576	20934	43576	-12	-18	223	217	-15	220	6	6	-15	220
-0.04105	0.28926	5.713												
segm: 4	20965	-43554	43554	20965	-60	-43	-45	-28	-51	-36	-17	-17	-36	-51
-0.04736	-0.13938	16.989												
segm: 5	20923	-43560	43560	20923	-29	69	-117	-19	20	-68	-98	-98	-68	20
-0.08944	0.05477	98.119												
segm: 6	-20923	-43574	20923	43574	42	19	56	33	30	44	23	23	30	44
0.08215	0.05786	22.999												
segm: 7	-20941	-43558	20941	43558	-54	-21	19	52	-37	35	-33	-33	-37	35
-0.10123	0.04604	-33.027												
Quad 2														
segm: 0	-20948	43585	43585	20948	0	0	0	0	0	0	0	0	0	0
0.00000	0.00000	0.000												
segm: 1	-20955	43560	43560	20955	0	0	0	0	0	0	0	0	0	0
0.00000	0.00000	0.000												
segm: 2	-20932	-43569	20932	43569	0	0	0	0	0	0	0	0	0	0
0.00000	0.00000	0.000												
segm: 3	-20908	-43545	20908	43545	0	0	0	0	0	0	0	0	0	0
0.00000	0.00000	0.000												
segm: 4	20929	-43547	43547	20929	0	0	0	0	0	0	0	0	0	0
0.00000	0.00000	0.000												
segm: 5	20914	-43551	43551	20914	0	0	0	0	0	0	0	0	0	0
0.00000	0.00000	0.000												
segm: 6	-20907	-43558	20907	43558	0	0	0	0	0	0	0	0	0	0
0.00000	0.00000	0.000												
segm: 7	-20911	-43481	20911	43481	0	0	0	0	0	0	0	0	0	0
0.00000	0.00000	0.000												
Quad 3														
segm: 0	-20978	43554	43554	20978	76	-1	-48	-125	37	-86	77	77	-86	37
-0.11313	0.10106	-76.759												
segm: 1	-20905	43552	43552	20905	-27	-21	-48	-42	-24	-45	-6	-6	-45	-24
-0.05920	-0.06578	5.979												
segm: 2	-20920	-43560	20920	43560	22	25	-30	-27	23	-28	-3	-3	23	-28
0.06299	-0.03683	-3.047												
segm: 3	-20919	-43551	20919	43551	26	5	-31	-52	15	-41	21	21	15	-41
0.04108	-0.05394	20.991												
segm: 4	20930	-43547	43547	20930	63	239	-265	-89	151	-177	-176	-176	-177	151

```

-0.23288    0.41335    175.587
segm: 5    20936   -43551    43551    20936    56    59   -61   -58    57   -59   -3   -3   -59    57
-0.07762    0.15599    2.992
segm: 6   -20912   -43545    20912    43545    23    15   -68   -76    19   -72    8    8    19   -72
0.05206   -0.09474    7.995
segm: 7   -20919   -43546    20919    43546    7    -5   -48   -60    1   -54   12   12    1   -54
0.00274   -0.07105    11.986

```

Constants

- ✓ Archive: /reg/g/psdm/detector/alignment/cspad/calib-cxi-camera2-2016-02-05/calib/CsPad::CalibV1/CxiDs2.0:Cspad.0/geometry/1-end.data
- ✓ first deployed as /reg/d/psdm/CXI/cxi01516/calib/CsPad::CalibV1/CxiDs2.0:Cspad.0/geometry/1-end.data

Quads alignment

2016-02-18 Alignment using Ag-behenate

Use Ag-behenate data of cxi01516 runs 21-23

Start with new optical measurements in /reg/g/psdm/detector/alignment/cspad/calib-cxi-camera2-2016-02-05/

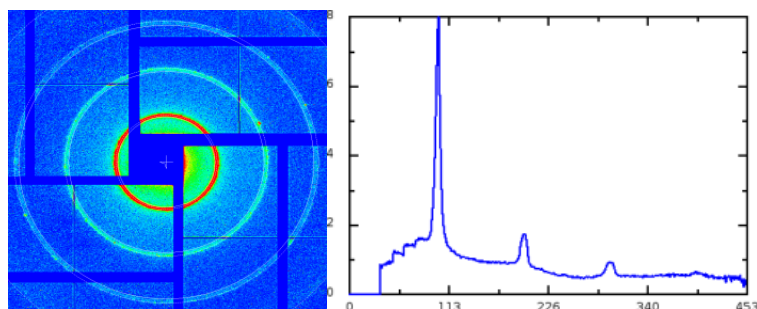
Commands:

```

# get averaged data
det_ndarr_average -d exp=cxi01516:run=21 -s CxiDs2.0:Cspad.0 -f nda-cspad-Ag-behenate -n 10000 -p -v

# tune geometry
geo -g geo-cxi01516-2016-02-05.data -i nda-cspad-cxi01516-r0022-e010000-CxiDs2-0-Cspad-0-ave-Ag-behenate.txt -x
1000 -y 1000 &

```



Archive: calib/CsPad::CalibV1/CxiDs2.0:Cspad.0/geometry/geo-cxi01516-2016-02-18-Ag-behenate-tuned.data

Essential constants:

CSPAD:V1	0	QUAD:V1	0	-5100	-3000	0	90.0	0.0	0.0	0.00000	0.00000	0.00000
CSPAD:V1	0	QUAD:V1	1	-2800	6350	0	0.0	0.0	0.0	0.00000	0.00000	0.00000
CSPAD:V1	0	QUAD:V1	2	6350	4800	0	270.0	0.0	0.0	0.00000	0.00000	0.00000
CSPAD:V1	0	QUAD:V1	3	4800	-4900	0	180.0	0.0	0.0	0.00000	0.00000	0.00000
RAIL	0	CSPAD:V1	0	-1300	-3000	1000000	0.0	0.0	0.0	0.00000	0.00000	0.00000
IP	0	RAIL	0	0	0	0	0.0	0.0	0.0	0.00000	0.00000	0.00000

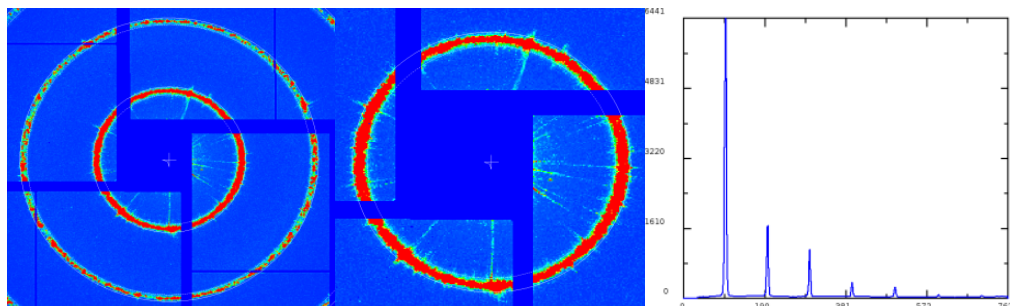
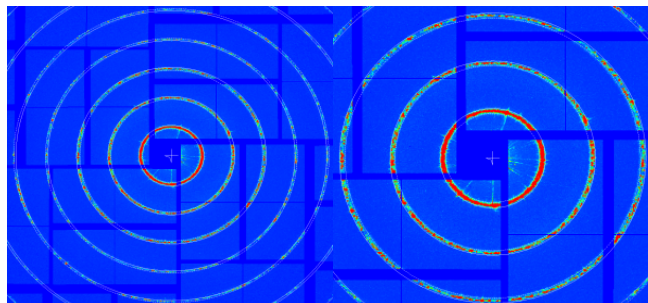
2016-03-11 Alignment using combination of runs

All files are located under directory: /reg/g/psdm/detector/alignment/cspad/calib-cxi-camera2-2016-02-05

Stage 1

Use very good Ag-behenate data cxi01516-r0022 and align all quads using this sample.

- `geo -x1000 -y1000 -g geo-cxi01516-2016-02-18.data -i nda-Ag-behenate-Z200-cxi01516-r0022-e012320-CxiDs2-0-Cspad-0-max.txt`
- create geometry file: `geo-cxi01516-r0022-2016-03-11.txt`
- images:

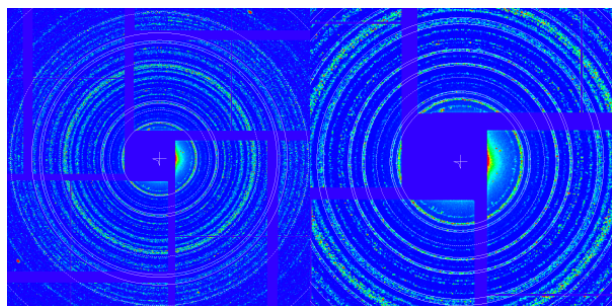


At further stages only minor (1pixel) quad corrections were applied

Stage 2

Use bright lysozyme data from run cxi01516-r0026

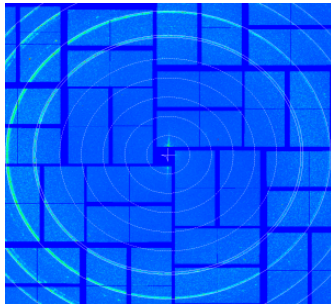
- `geo -x1000 -y1000 -g geo-cxi01516-r0022-2016-03-11.txt -i nda-lysozyme-cxi01516-r0026-e093480-CxiDs2-0-Cspad-0-max.txt`
- move entire detector, create geometry file `geo-cxi01516-r0026-2016-03-11.txt`
- images:



Stage 3

Use nozzle-ring data from run cxi02416-r0008

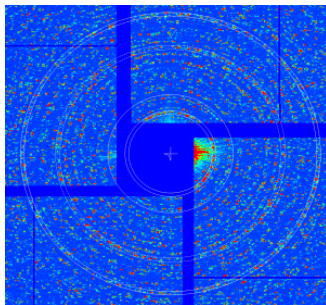
- `geo -x1000 -y1000 -g geo-cxi01516-r0026-2016-03-11.txt -i nda-nozzle-ring-cxi02416-r0008-e069865-CxiDs2-0-Cspad-0-max.txt`
- move entire detector, create geometry file `geo-cxi02416-r0008-2016-03-11.txt`
- image:



Stage 4

Use barely seen lysozyme data from run me-cxi02416-r0010

- `geo -x1000 -y1000 -g geo-cxi02416-r0008-2016-03-11.txt -i nda-lysozyme-cxi02416-r0010-e052421-CxiDs2-0-Cspad-0-max.txt`
- move entire detector, create geometry file `geo-cxi02416-r0010-2016-03-11.txt`
- image:



Alignment conclusion:

- Quad alignment obtained with `nda-Ag-behenate run cxi01516-r0022` works fine with all other data
- For each other data-set, if detector was moved its position needs to be re-aligned.

Further cross-check

- use `geo-cxi02416-r0010-2016-03-11.txt` and apply Oleksandr's geometry correction
- check corrected geometry with `cxi01516 run22` and `26`

References

- [CSPAD Alignment](#)