

Geometry History

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CXI

Notes

Below are tables that can be updated with time-ordered publicly-released geometry files (**most recent at top of table**).

All geometry formats used by LCLS ([crystfel-hdf5](#), [crystfel-cxldb](#), [cctbx](#), [psana](#)) can be placed here.

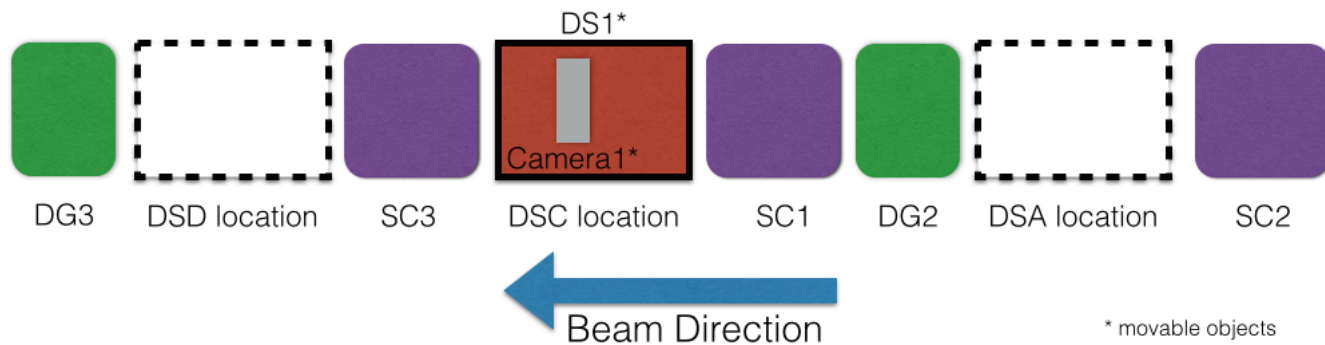
Information about methods to convert geometry files between different formats can be found [here](#).

Optical measurements can be found [HERE](#). Corrected [optical metrology](#) in text format can be found under the page [CSPAD Alignment](#).

Diagram

Note the DS1 and DS2 chambers can move to different locations. Also, Camera1 and Camera2 can move between DS1 and DS2 chambers. Sample chambers, SC1-SC3 are fixed.

Valid from 15/May/16



Geometries

Date	Who uploaded	Experiment	Geometry File Name	File Type	DAQ "Source" Name (Ds1/Ds2)	Front /Back	Camera	Comment
2020-08-25	yoona	cxic00318	123-end.data cxic00318.geom	psana /crystfel	CxiDs1.0: Jungfrau.0 jungfrau4M	Front	Jungfrau	Indexed lysozyme run123 with CrystFEL
2019-08-08	cpo		geometry-2019-05-06.txt	psana			Epix10ka2M	Currently the only Epix10ka2M that we have. Details about geometry can be found here .
2017-06-29	yoona	cxil0416	cxil0416.geom	crystfel	CxiDs1.0: Cspad.0	Front		Based on dubrovin's psana geometry, tweaked x,y,z detector position with psocake to optimize indexing results. Prediction refine / geoptimization was NOT performed.
2017-06-07	dubrovin	cxil0416	/reg/g/psdm/detector/alignment/cspad/calib-cxi-camera1-2014-09-24/calib/CsPad::CalibV1/CxiDs1.0: Cspad.0/geometry/geometry-camera1-in-ds1-cxil0416-r0028.data	psana	CxiDs1.0: Cspad.0	Front	Camera1_V16_20140924?	Tuning with geo using cxil0416-r0028 NOTE: x and y tilt angles were applied
2016-12-19	yoona	cxil04216	53-end.data	psana	CxiDs1.0: Cspad.0	Front		CrystFEL predefine geometry converted to psana format using psgeom
2016-09-29	yoona	cxic0315	cxic0315.geom	crystfel	CxiDs2.0: Cspad.0	Back		Valid from 21/Sep/16
2016-09-29	yoona	cxil11716	cxil11716.geom	crystfel	CxiDs1.0: Cspad.0	Front		Optimized using detector-shift
2016-05-25	dubrovin	from 05/25	/reg/g/psdm/detector/alignment/cspad/calib-cxi-camera2-2016-05-25/calib/CsPad::CalibV1/CxiDs2.0: Cspad.0/geometry/0-end.data	psana	CxiDs2.0: Cspad.0		Camera2_V16_20160525?	New optical measurements from 2016-05-25. Quad positions age not aligned
2016-05-25	yoona	cxil06216	cxil9415_v5.geom (crystfel) 22-end.data (psana)	crystfel /psana	CxiDs1.0: Cspad.0	Front	Camera1_V16?	Geometry file optimized using lysozyme by O. Yefanov using intor.
2016-04-26	cpo	cxil8416	cxil8416_v2.geom (crystfel) cxil8416_v3.dat (psana)	crystfel /psana	CxiDs2.0: Cspad.0	Front	Camera2_V16_20160205	psana translated from crystfel and moved -200um in x and -100um in y using geo to center lysozyme rings from runs 153,154,155
2016-04-12	yoona	cxil06416	0-end.data	psana	CxiDg2.0: Cspad2x2.0	Back		Geometry file optimized using diffraction from a sphere.
2016-02-27	yoona	cxil02416	cxil02416_400.geom	crystfel-cxldb	CxiDs2.0: Cspad.0	Front	Camera2_V16_20160205	Geometry file optimized using lysozyme. The xxx in cxil02416_xxx.geom represents the camera length. The detector was translated in x & y w.r.t powder ring and detector_shift script was used to correct for offset.
2016-01-09	yoona	cxic0915	cxic0915_100.geom cxic0915_200.geom cxic0915_300.geom cxic0915_400.geom cxic0915_480.geom	crystfel-cxldb	CxiDs1.0: Cspad.0	Front	Camera1_V16_20140924	The refined geometry file for detector calibration by Chuck Yoon. The xxx in cxic0915_xxx.geom represents the camera length. The detector was translated in x & y w.r.t powder ring at different detector distances.
2015-12-22	valerio	cxil9415	cxil9415.geom	crystfel-cxldb	CxiDs1.0: Cspad.0	Front	Camera1_V16_20140924	The refined geometry file for LJ94 from Nadia Zatsepin. PI: Dominik Oberthuer Thanks to Yun-Xing Wang for the data used for the refinement
2015-12-07	yoona	cxic0915	cxic0915-v4.geom	crystfel-cxldb	CxiDs1.0: Cspad.0	Front	Camera1_V16_20140924	The refined geometry file for detector calibration by Chuck Yoon. We thank Petra Fromme's team for the phycocynin sample.
2015-11-12	yoona	cxil4915	cxil4915-v12.geom	crystfel-cxldb	CxiDs1.0: Cspad.0	Front	Camera2_V16_20150120	The refined geometry file for L049 using Intor from Nadia Zatsepin. PI: Petra Fromme Please acknowledge Petra's team for the use of this geometry file in your research if you use any part of this geometry file. Do not remove the history section of the geom file.
2015-07-14	valerio	cxih9615	/reg/g/psdm/detector/alignment/cspad/openGeom /crystfel/ cxih9615_gv_v1.geom	crystfel-cxldb	CxiDs2.0: Cspad.0		Camera1_V16_20140924	File from 2015-06-27 further refined using more data

2015-06-27	valerio	cxih9615	/reg/g/psdm/detector/alignment/cspad/openGeom/crystfel/	crystfel-cxib	CxiDs2.0: Cspad.0		Camera1_V16_20140924	The refined geometry file for LH96 (Obertheuer beamtime)
2015-06-02	dubrovin	cxih8015	/reg/g/psdm/detector/alignment/cspad/calib-cxi-camera1-2014-09-24/calib/CsPad::CalibV1/CxiDs1.0: Cspad.0/geometry/geometry-camera1-in-ds2-cxih8015-r176.data	psana	CxiDs2.0: Cspad.0		Camera1_V16_20140924	Generated from /reg/g/psdm/detector/alignment/cspad/calib-cxi-camera1-2014-09-24/2014-09-24-CSPAD-CXI-Camera1-Metrology-corr.txt Geometry file is deployed for cxi86715
2015-04-01	valerio	cxii6315	/reg/g/psdm/detector/alignment/cspad/openGeom/crystfel/	crystfel-cxib	CxiDs1.0: Cspad.0		Camera2_V16_20150120	The refined geometry file for LI63 (Zatsepin beamtime) Misabeled in openGeom folder Caution: geoptimiser v0.6.0 has a bug which could have effected this geom file.
2015-03-26	cpo		/reg/g/psdm/detector/alignment/cspad/calib-cxi-camera1-2014-09-24/calib/CsPad::CalibV1/CxiDs1.0: Cspad.0/geometry/0-end.data	psana	CxiDs1.0: Cspad.0		Camera1_V16_20140924	Generated from 2014-09-24-CSPAD-CXI-Camera1-Metrology.xlsx. No quad alignment.
2015-03-26	cpo		/reg/g/psdm/detector/alignment/cspad/calib-cxi-camera2-2015-01-20/calib/CsPad::CalibV1/CxiDs2.0: Cspad.0/geometry/0-end.data	psana	CxiDs2.0: Cspad.0		Camera2_V16_20150120	Generated from 2015-01-20-CSPAD-CXI-Camera2-Metrology.xlsx. No quad alignment.
2015-03-25	blaj		2014-09-24-CSPAD-CXI-Camera1-Metrology.xlsx	xlsx			Camera1_V16_20140924	optical metrology
	dubrovin		/reg/g/psdm/detector/alignment/cspad/calib-cxi-camera1-2014-09-24/2014-09-24-CSPAD-CXI-Camera1-Metrology.txt	txt				converted using calibman
2015-03-25	blaj		2015-01-20-CSPAD-CXI-Camera2-Metrology.xlsx	xlsx			Camera2_V16_20150120	optical metrology
	dubrovin		/reg/g/psdm/detector/alignment/cspad/calib-cxi-camera2-2015-01-20/2015-01-20-CSPAD-CXI-Camera2-Metrology.txt	txt				converted using calibman
2015-03-21	valerio	cxig0915	/reg/g/psdm/detector/alignment/cspad/openGeom/crystfel/	crystfel-cxib	CxiDs1.0: Cspad.0		Camera2_V16_20150120	The final refined geometry file for LG09 (Schmidt beamtime) for CXIB data format. Misabeled in openGeom folder
2014-12-17	koglin		/reg/g/psdm/detector/alignment/cspad/Dg4Cspad_ami_20141217_geo.1e000a00.dat	ami			Camera3_V16_20131009	Need to copy over (permissions?) cp /reg/g/peds/pds/cspadcalib/geo.1e000a00.dat /reg/g/psdm/detector/alignment/cspad/Dg4Cspad_ami_20141217_geo.1e000a00.dat

Camera History

Camera1_V16_20140924

- Optical Metrology file:
 - 2014-09-24-CXI-Camera1-Metrology.xlsx
 - <<https://confluence.slac.stanford.edu/download/attachments/107749188/2014-09-24-CXI-DS1-Metrology.xlsx?version=1&modificationDate=1414457576000&api=v2>>
- 2014-09-24 -- fixed and moved to DS2 chamber
 - mixed quadrants:
 - 3 old A boards (Q0, Q1, Q2), 4/40
 - 1 new board (Q3), 3/19
- 2014-11-19 -- DS1 @ DSD
 - moved back to DS1 chamber in DSD location
 - Used for PCS, IH and cxig3616
- 2015-01-10 -- DS1 @ DSC location
 - Used for cxig1515
 - src = 'DetInfo(CxiDs1.0:Cspad.0)'
 - alias = DscCsPad
 - Relative detector Z position:
 - alias = 'DscCsPad_z'
 - pv = 'CXI:DS1:MMS:06.RBV'
- 2015-03-17 -- DS2 @ DSD location
 - Camera 1 was moved to DS2 chamber at DSD location.
 - The previously broken D50 Concentrator was replaced with older concentrator.
 - Quadrants 2 and 0 were swapped.
 - Back detector (generally not used) for SC1 experiments from 2015-03-18 to 2015-05-04
 - src = 'DetInfo(CxiDs2.0:Cspad.0)'
 - alias = DsdCsPad

- Relative detector Z position:
 - alias = 'DsdCsPad_z'
 - pv = 'CXI:DS2:MMS:06.RBV'
- 2015-05-04 -- DS2 @ DSD
 - Cables for Camera 1 in DS2 corrected and collimator pipe removed from front DS1
 - Back detector for SC1 experiments from 2015-05-04 to 2015-05-17
 - src = 'DetInfo(CxiDs2.0:Cspad.0)'
 - alias = DsdCsPad
 - Relative detector Z position:
 - alias = 'DsdCsPad_z'
 - pv = 'CXI:DS2:MMS:06.RBV'
- 2015-12-07 -- DS1 @ DSC
 - Camera1 was moved from DS2 (at DSD) to DS1 (at DSC) because Camera2 in DS1 was damaged.
 - src = 'DetInfo(CxiDs1.0:Cspad.0)'
 - alias = DscCsPad
 - Relative detector Z position:
 - alias = 'DscCsPad_z'
 - pv = 'CXI:DS1:MMS:06.RBV'

Camera2_V16_20150120

- 2015-02-02 -- DS2 chamber with refurbished Camera2 moved to DSA location
 - Non-standard configuration given D50 CsPad rack concentrator, which is normally used with DS2 chamber, was broken.
 - Used D51 CsPad rack for concentrator and motors February 2015 experiments in the SC2 (a.k.a. SC01, 100nm focus chamber).
 - cxig0715, cxie7015, cxie7515 and cxif5315
 - src = 'DetInfo(CxiDs2.0:Cspad.0)'
 - alias = DsaCsPad
 - Relative detector Z position:
 - alias = 'DsaCsPad_z'
 - pv = 'CXI:DS1:MMS:06.RBV'
 - Similarly, other relevant epicsStore aliases begin with DsaCsPad.
 - The mapping of the D50 concentrator is rotated by 90 relative to the D51 concentrator.
- 2015-03-03 -- Moved DS2 chamber with Camera2 to DSD location
 - Used for SPI experiment cxi86415
 - src = 'DetInfo(CxiDs2.0:Cspad.0)'
 - alias = DsdCsPad
 - Relative detector Z position:
 - alias = 'DsdCsPad_z'
 - pv = 'CXI:DS2:MMS:06.RBV'
 - Note pipe in front DS1 chamber detector during this experiment was removed, but the holder for it was still in providing circular aperture for back DS2 detector
- 2015-03-17 -- Added shield and pipe and moved Camera2 to DS1 chamber
 - Used for SC1 experiments starting at the end of Run10:
 - cxig0915, cxii6315, cxih0115, cxih0815, April PCS, cxih9515, cxii2415, ...
 - src = 'DetInfo(CxiDs1.0:Cspad.0)'
 - alias = DscCsPad
 - Relative detector Z position:
 - alias = 'DscCsPad_z'
 - pv = 'CXI:DS1:MMS:06.RBV'
 - Detector Attenuation from shields and coatings (pipe and additional shielding required for laser experiments):
 - CsPad Pipe Al Shield Transmission:
 - 8 um thick polyimide
 - 1 um thick Al on upstream side
 - 1.75 um thick Al on downstream side
 - The detectors have 0.25 um thick Al coating.
 - > 3 um total Al
- 2015-05-04 -- Removed shield and pipe from Camera2 in DS1 chamber
 - Used for SC1 experiments starting with cxih8015:
 - src = 'DetInfo(CxiDs1.0:Cspad.0)'
 - alias = DscCsPad
 - Relative detector Z position:
 - alias = 'DscCsPad_z'
 - pv = 'CXI:DS1:MMS:06.RBV'

Camera2_V16_20140827

- 2014-08-27 -- Refurbished Camera2 installed in DS1 chamber
 - Metrology:
 - [2014-08-27-CXI-DS2-Metrology.xlsx](#)
 - Quad 1 (zero based counting) reworked; metrology updated, the other 3 quads (Q0, Q2, Q3) are unchanged (as in the previous metrology: May 14, 2014).
 - Used for Run 10 experiments from 2014-10-16 until it was damaged in November 2014 (cxig2614, cxif7214, cxie7914, Nov PCS)
 - src = 'DetInfo(CxiDs1.0:Cspad.0)'
 - alias = Ds1CsPad
 - Relative detector Z position:
 - no alias defined
 - pv = 'CXI:DS1:MMS:06.RBV'

Camera1_V16_20140319

- 2014-03-19 -- Camera1 rebuilt
 - Metrology:
 - [2014-03-19-CSPAD-CXI-DS1-Metrology.xlsx](#)
 - Quad 1 (zero based counting) reworked; metrology updated, the other 3 quads (Q0, Q2, Q3) are unchanged (as in the previous metrology: May 14, 2014).
 - Used as:
 - Front detector at DSC for SC1 experiment IH Milathianaki cxii0114 (damaged asic with laser) and cxid8114
 - Moved to DSA location for SC2 chamber experiments for cxic9714 and cxid5514
 - cxid2714 (moved to back detector after Z motor issues during cxid2714)
 - Info:
 - src = 'DetInfo(CxiDs1.0:Cspad.0)'
 - alias = Ds1CsPad
 - Relative detector Z position:
 - no alias defined
 - pv = 'CXI:DS1:MMS:06.RBV'

Camera1_V16_20131220

- 2013-12-20 -- Camera1 upgraded to V16
 - Metrology:
 - [2013-12-20-CSPAD-CXI-DS1-Metrology.xlsx](#)
 - Front detector for SC1 experiments starting in January 2014 including January PCS, cxia2514, cxii0214, cxib3214, cxib6714.
 - src = 'DetInfo(CxiDs1.0:Cspad.0)'
 - alias = Ds1CsPad
 - Relative detector Z position:
 - no alias defined
 - pv = 'CXI:DS1:MMS:06.RBV'

Camera2_V16_20131212

- 2013-12-12 -- Camera2 upgraded to V16
 - Metrology:
 - [2013-12-12-CSPAD-CXI-DS2-Metrology.xlsx](#)
 - Used for experiments???.
 - src = 'DetInfo(CxiDsd.0:Cspad.0)'
 - Relative detector Z position:
 - pv = 'CXI:DS2:MMS:06.RBV'
- 2014-06-02 -- Ds2 chamber moved to DSC location
 - Changed name from CxiDsd (36) to CxiDs2 (33) in both the cxi.cnf file and the configdb CsPad02 definition.
 - Used as front detector for cxid6214, cxid9114, cxic4414, cxid5714, cxid6014, July 2014 PCS, cxic8214
 - src = 'DetInfo(CxiDs2.0:Cspad.0)'
 - Relative detector Z position:
 - pv = 'CXI:DS2:MMS:06.RBV'
 - Detector upside down?

Camera3_V16_20131009

- Metrology file:
 - [2013-10-09-CSPAD-XPP-Metrology.xlsx](#)
- Out of vacuum camera typically used in XPP and XCS.
- 2014-12-17 -- Used in CXI at DG4 location in December 2014.
 - XCS concentrator
 - D50 MPOD power
 - Detector quads rotated 90 deg
 - src = 'DetInfo(CxiDg4.0:Cspad.0)'
 - Relative detector Z position:
 - alias = 'Dg4CsPad_z'
 - pv = 'CXI:DG4:MMS:16.RBV'

References

Documentation on data formats

- [cxi db](#) - web documentation
- [crystfel](#) - page of T. A. White at DESY
- [cctbx](#) - sourceforge
- [psana](#) - confluence

Relevant documents, publications

- [cheetah](#) - github, Anton Barty
- [dxtbx-the diffraction experiment toolbox](#), Aaron Brewster
- [XFEL Detectors and ImageCIF](#)
- [Diffraction Geometry](#), D.J.Thomas
- [Calibration Management Tool](#) (calibman)
- [CSPAD Alignment](#) - alignment summary
- [psgeom](#) - T.J. Lane converter between geometry formats in github

MEC

NOTE: When a new geometry is available it is important for the MEC people to update the appropriate mecana file which has a list of "current" geometries. An example filename with this information is `/reg/g/pcds/package/mecana/mecana-0.0.8/mecana/cspaddata.py`

Geometries

Date	Who uploaded	Experiment	Geometry File Name	File Type	DAQ "Source" Name (Ds1/Ds2)	Front /Back	Camera	Comment
2017-10-20	dubrovin	valid after 2017 /10/20	/reg/g/psdm/detector/alignment/cspad/calib-mec-2017-10-20/calib/CsPad::CalibV1/MecTargetChamber.0:Cspad.0/geometry/0-end.data	psana	MecTargetChamber.0:Cspad.0			Gabriel replaced two 2x2s in Q1 and all four in Q2. See details .
2017-04-22	dubrovin	valid after 04/22 /217	/reg/g/psdm/detector/alignment/cspad/calib-mec-2017-04-22/calib/CsPad::CalibV1/MecTargetChamber.0:Cspad.0/geometry/1-end.data-2017-04-22-CSPAD-MEC-After	psana	MecTargetChamber.0:Cspad.0			New metrology for quads from Gabriel Blaj
2017-04-22	dubrovin	valid before 04 /19/2017	/reg/g/psdm/detector/alignment/cspad/calib-mec-2017-04-22/calib/CsPad::CalibV1/MecTargetChamber.0:Cspad.0/geometry/0-end.data-2017-04-19-CSPAD-MEC-Before-corr	psana	MecTargetChamber.0:Cspad.0			New metrology for quads from Gabriel Blaj
2016-04-21	dubrovin	from 04/21 2016	/reg/g/psdm/detector/alignment/cspad/calib-mec-2016-04-21/calib/CsPad::CalibV1/MecTargetChamber.0:Cspad.0/geometry/0-end.data	psana	MecTargetChamber.0:Cspad.0			
2016-02-16	dubrovin	from 02/16 to 04/21 2016	/reg/g/psdm/detector/alignment/cspad/calib-mec-2016-02-16/calib/CsPad::CalibV1/MecTargetChamber.0:Cspad.0/geometry/0-end.data	psana	MecTargetChamber.0:Cspad.0			
2015-12-14			/reg/g/psdm/detector/alignment/cspad/calib-mec-2016-02-04/geo-2015-12-14.data	psana				

XPP

Geometries

Date	Who uploaded	Experiment	Geometry File Name	File Type	DAQ "Source" Name	Front /Back	Camera	Comment
2017-11-03	dubrovin		/reg/g/psdm/detector/alignment/cspad/calib-xpp-2017-11-03-camera3/calib/CsPad::CalibV1/XppGon.0:Cspad.0/geometry/0-end.data 2017-11-03-CSPAD-XPP-Camera3-Metrology.xlsx 2017-11-03-CSPAD-XPP-Camera3-Metrology.txt	psana	XppGon.0:Cspad.0		Camera 3	camera repaired, 2017-11-03 XPP CSPAD Camera3 Alignment
2017-03-24	cpo/dubrovin		/reg/g/psdm/detector/alignment/cspad/calib-xpp-2016-08-22-camera3/calib/CsPad::CalibV1/XppGon.0:Cspad.0/geometry/0-end-corr-2017-03-24.data	psana	XppGon.0:Cspad.0		Cspad	this corrected an error in the optical metrology measurements where the quads were measured in the wrong order, requiring a 90 degree rotation. This camera also moved to XCS and MFX in 2017.
2016-11-22	yoona	xppn3816	xppn3816.geom , 21-end.data	crystfel / psana	XppEndstation.0:Rayonix.0		Rayonix	

2016-08-22	dubrovin		/reg/g/psdm/detector/alignment/cspad/calib-xpp-2016-08-22-camera3/calib/CsPad::CalibV1/XppGon.0:Cspad.0/geometry/0-end.data	psana	XppGon.0:Cspad.0			
2016-08-22	blaj dubrovin		2016-08-22-CSPAD-XPP-Camera3-Metrology.xlsx 2016-08-22-CSPAD-XPP-Camera3-Metrology.txt	metrology	XppGon.0:Cspad.0		Camera 3	applied to all experiments taken after August 19, 2016
2013-10-09	dubrovin		/reg/g/psdm/detector/alignment/cspad/calib-xpp-2013-10-09/calib/CsPad::CalibV1/XppGon.0:Cspad.0/geometry/0-end.data	psana	XppGon.0:Cspad.0			
2013-10-09	blaj dubrovin		2013-10-09-CSPAD-XPP-Metrology.xlsx 2013-10-09-CSPAD-XPP-Metrology.txt	metrology	XppGon.0:Cspad.0		Camera 3	

MFx

Geometries

Date	Who uploaded	Experiment	Geometry File Name	File Type	DAQ "Source" Name	Front /Back	Camera	Comment
2020-09-17	yoona	mfx00118	214-end.data mfx00118.geom	psana / crystfel	MfxEndstation.0: Epix10ka2M.0 epix10k2M		Epix10ka2M	Geometry based on lysozyme (indexing rate: 11%) and silver behenate
See 2017-03-24 entry in XPP								
2016-11-22	yoona		mfx.geom 1-end.data	crystfel / psana	MfxEndstation.0:Rayonix.0		Rayonix	Psana detector centred in x,y,z using psocake. Converted to crystfel geometry using psgeom.
2017-02-21	yoona	mfxn1116	mfxn1116_v5a.geom	crystfel	MfxEndstation.0:Cspad.0		Cspad	Geoptimized geometry courtesy of Oleksandr Yefanov. This was a Cspad borrowed from XPP.
2020-08-25	yoona	mfx00318	1-end.data	psana	MfxEndstation.0: Epix10ka2M.0 epix10k2M		Epix10ka2M	Recentered on lysozyme rings using Psocake
2021-05-17	cpo/brewster	mfxlv4318	epix_run23.expt	dials	epix10k2M			From /reg/d/psdm/mfx/mfxlv4318/results/common /geom/epix_run23.expt

AMO

Geometries

Date	Who uploaded	Experiment	Geometry File Name	File Type	DAQ "Source" Name	Front/Back	Camera	Comment
2017-06-16	yoona		pnccd-jun16-v1.geom	crystfel			pnCCD	Optimized with hdfsee

References

- Some slides on SPI [pnCCD geometry](#)
- [CSPAD Alignment](#)
- [CSPAD Geometry and Alignment](#)
- [Detector Geometry](#)
- [CSPad metrology and calibration files, links](#)
- [Calibration Management Tool](#)