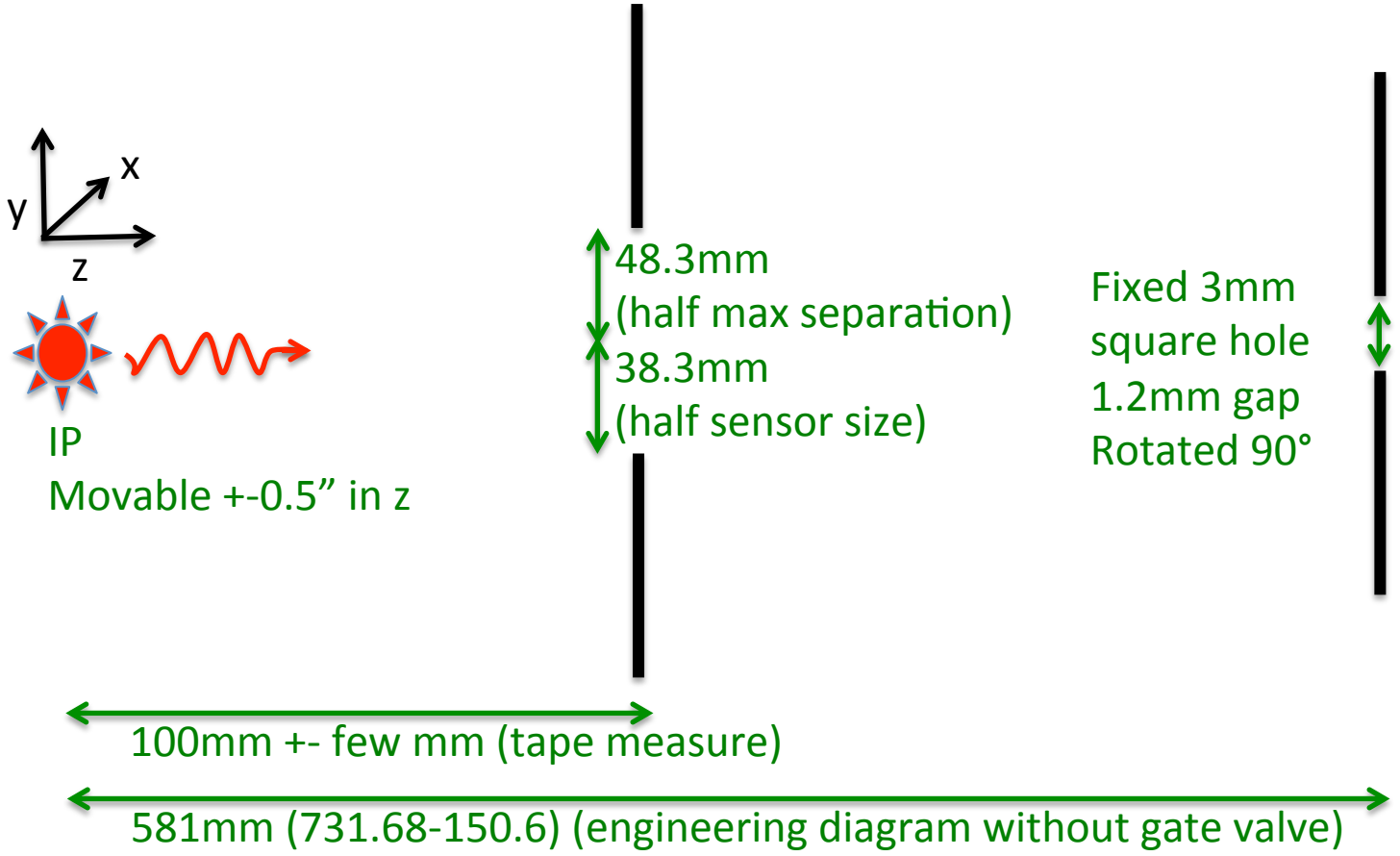
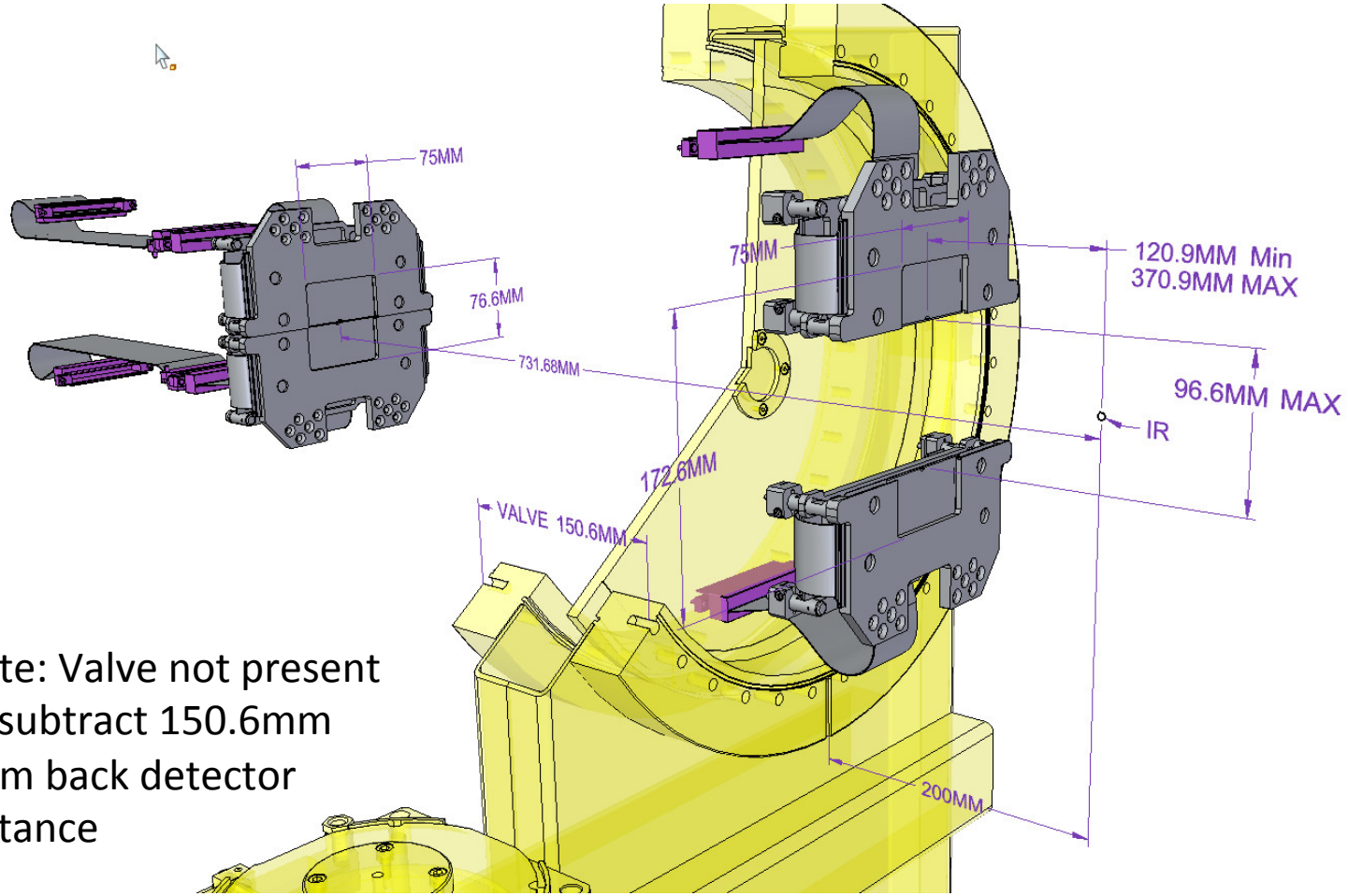
SPI pnCCD Geometry Update



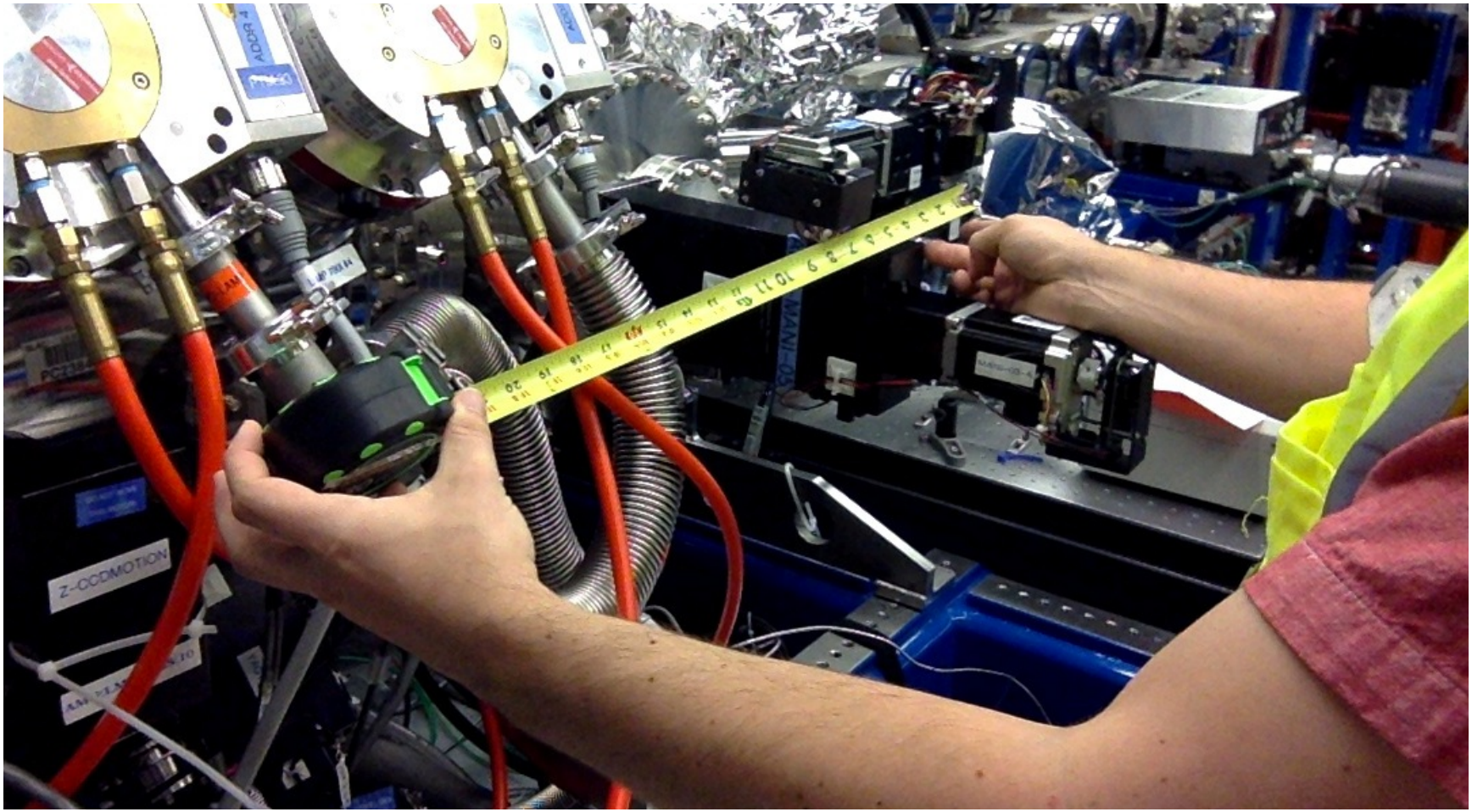
Engineering Drawing z-Distance



Note: Valve not present so subtract 150.6mm from back detector distance

Talked with Philip Hart, Michael Holmes, Timur Osipov

Checking The Engineering Drawing z-Distance

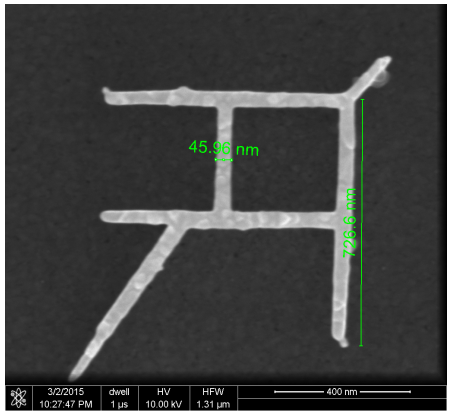


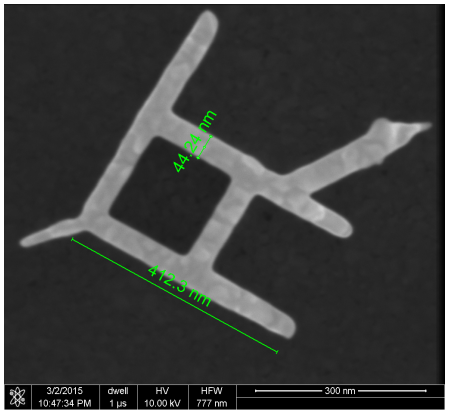
Andy measured 23” or 24” (584mm-610mm) to center of sample chamber

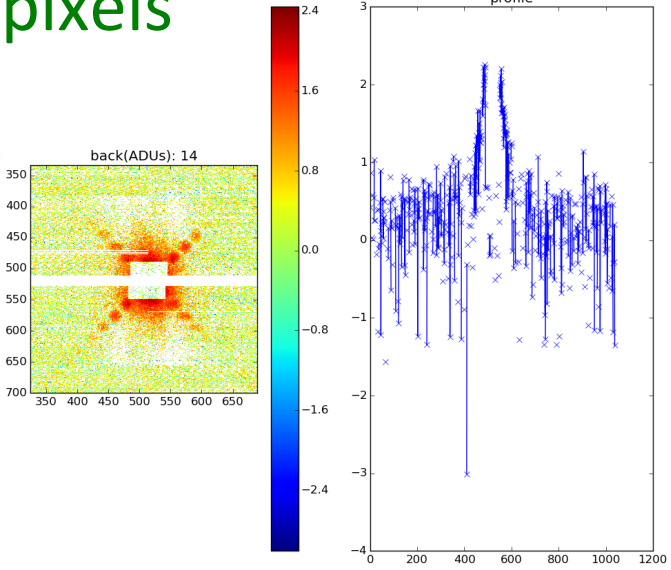
Z Measurement with Nano-K (Chuck Yoon)

Detector Distance [mm]	Edge of Square Size [um]	Expected Speckle Size [pixels]
584	250	21
584	400	13
731	250	27
731	400	17

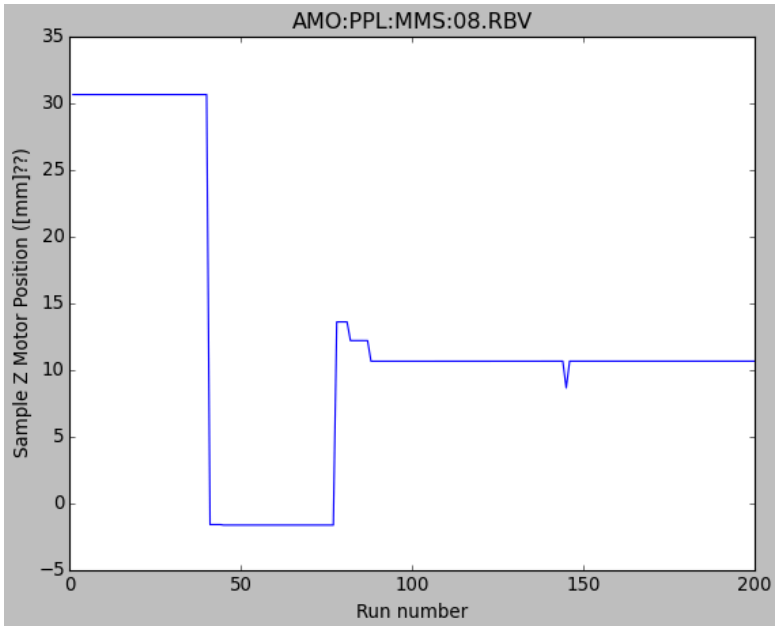
Measured speckle size: 28 pixels

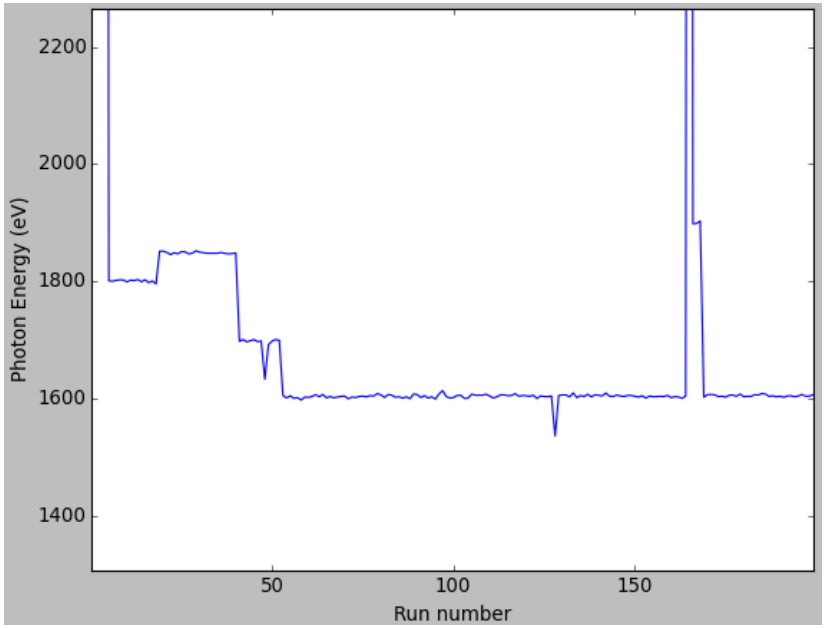






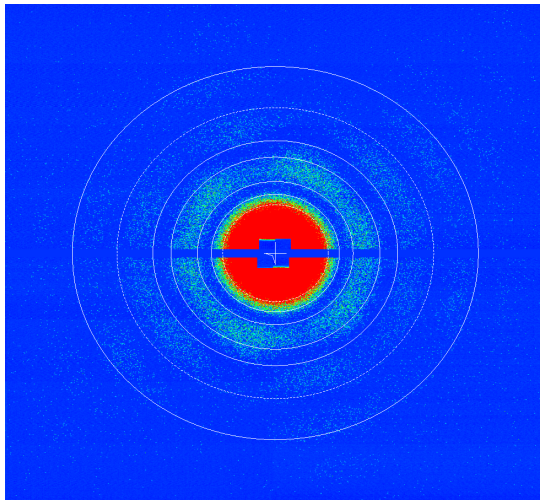
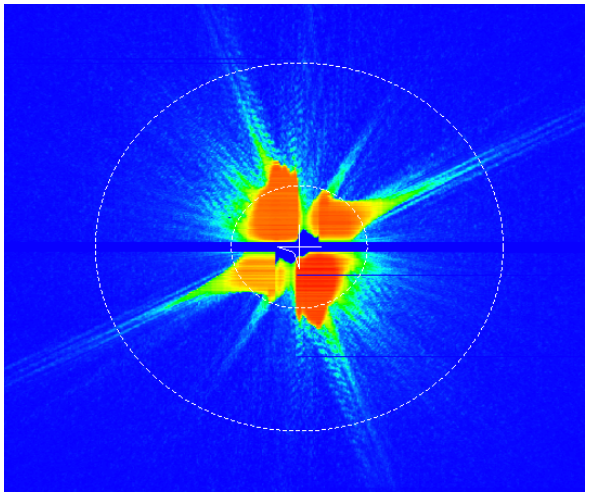
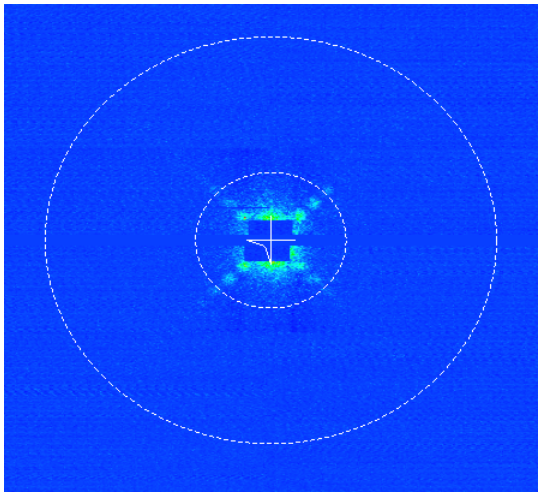
Checks: Sample Motor Z-Position and Photon Energy vs. Run Number





Back Detector Gap Measurement

- 1.2mm, with small offset between two halves

Summary

- For the moment, a z-Distance mystery:
  - Drawings/Tape-measure: 581mm +- 12.7mm
  - Nano-K/RDV: 731mm
- Back detector gap: 1.2mm
- 90° rotation of back detector
- Geometry deployed in psana calib-dir (currently with 581mm z-distance)

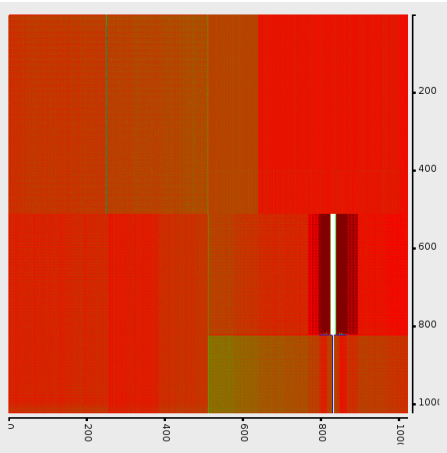
Extra Slides

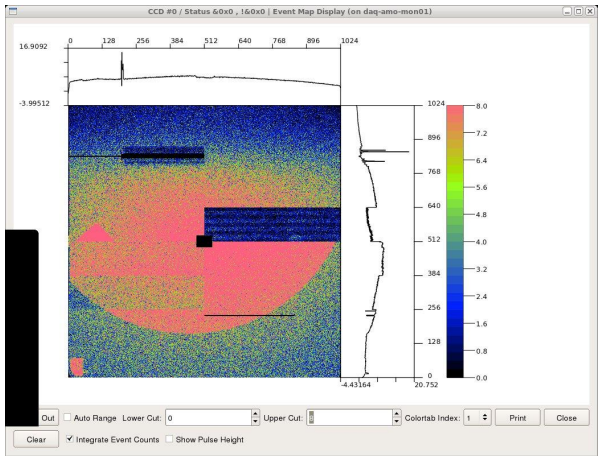
Notes

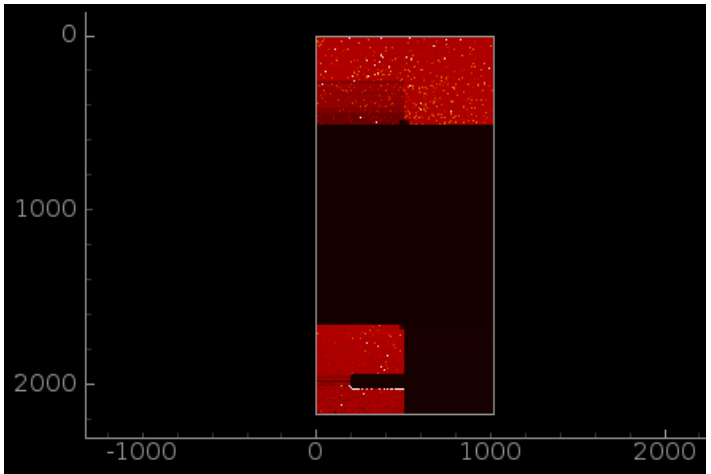
- Front detector has “bad half” in the -y direction (according to Hart/Mitra). This is from table 3 from this document, where it says that the two lowest numbered quads are the “top”. They have observed that the cable labeled T-21 is physically near the top of the chamber for the front-detector. Mikhail Dubrovin has found quads 2,3 (counting from zero) are the “bad half”, hence near the bottom:
  - Lamp User Manual (confluence)
- The front-detector bad-half is “closer one” to IP in y (according to Aquila): it was moved in y until it started creating a shadow on the back detector
- Back detector has the corresponding half in the -x direction (i.e. 90 degree rotation; see slide 4)
- The two pnCCD halves are separated in z by 2.65mm. Phil says the half labelled “top” which is the first one read out in the data is closer to the IP
- Detectors well-aligned in x
- Back detector is well-centered on beam

Sign of 90° Rotation

- Given the 90-degree rotation between front/back detectors, what is the correct sign for the rotation in the psana geometry file?
- Matt Weaver says AMI (left) shows detector as viewed from the front, while Xonline (middle) shows detector from the back. Psana (right, with big geometry gap) looks like ami (i.e. **front view!**) but rotated 90.
- Sven Herrmann also says that the Xonline view is from the back (like they do in astronomy)
- Psana/matplotlib view from front has x increasing downward and y is toward right ("matrix" display) but in the official reference frame (see slide 1) x increases to the left when viewed from front. This means psana needs a 180 rotation around y to get x to match the official frame. i.e. the "back view" is more natural for the official reference frame. We should then rotate back detector -90 around z to get the "corresponding half" to point in the -x direction (see notes on slide 2). Both detectors should get the 180 y-rotation if we want the coordinate system in slide 1.

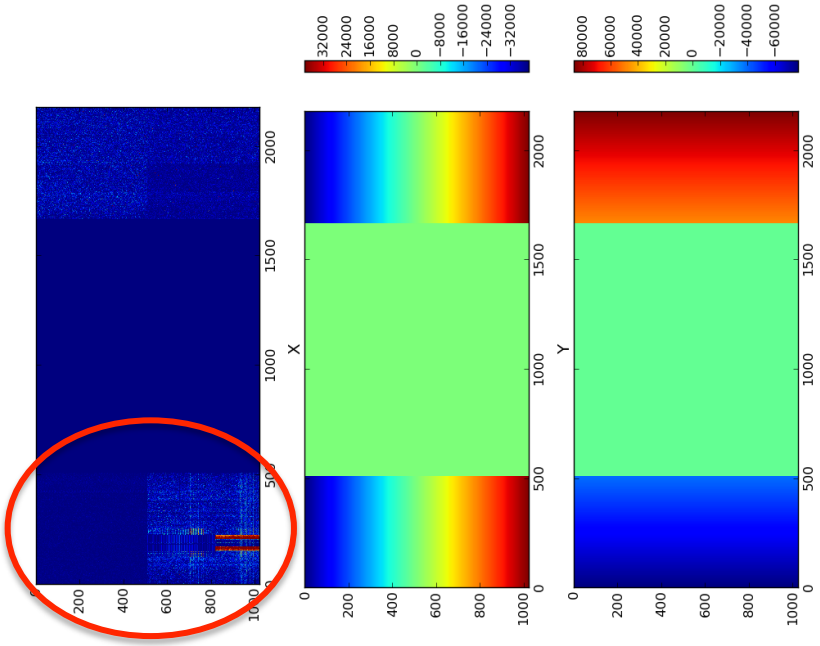






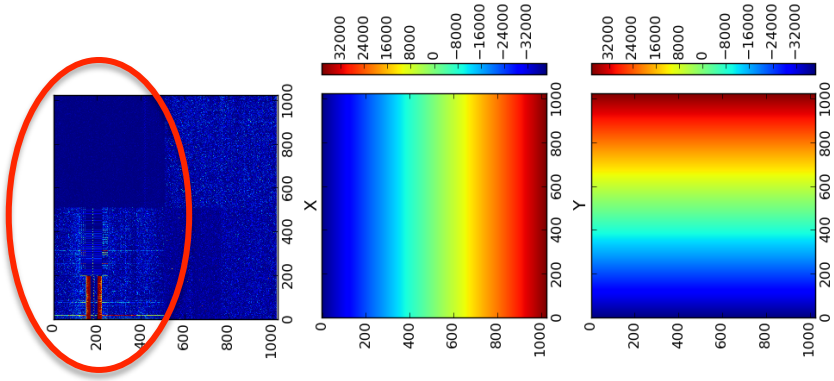
Psana Images With Deployed Geometry

Front Detector



Bad quads in –y, viewed from back of detector

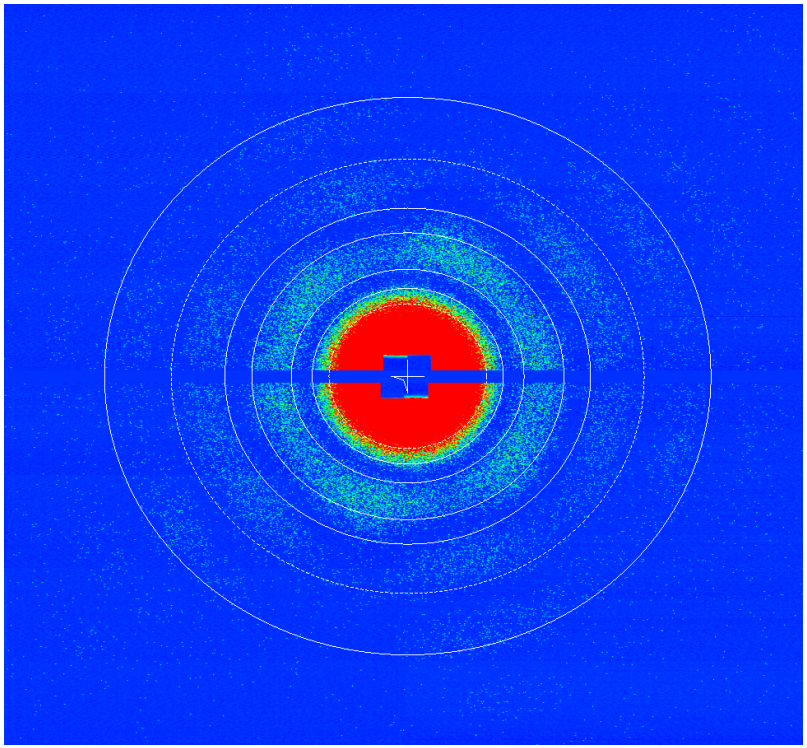
Back Detector (but using same front detector data for clarity!)



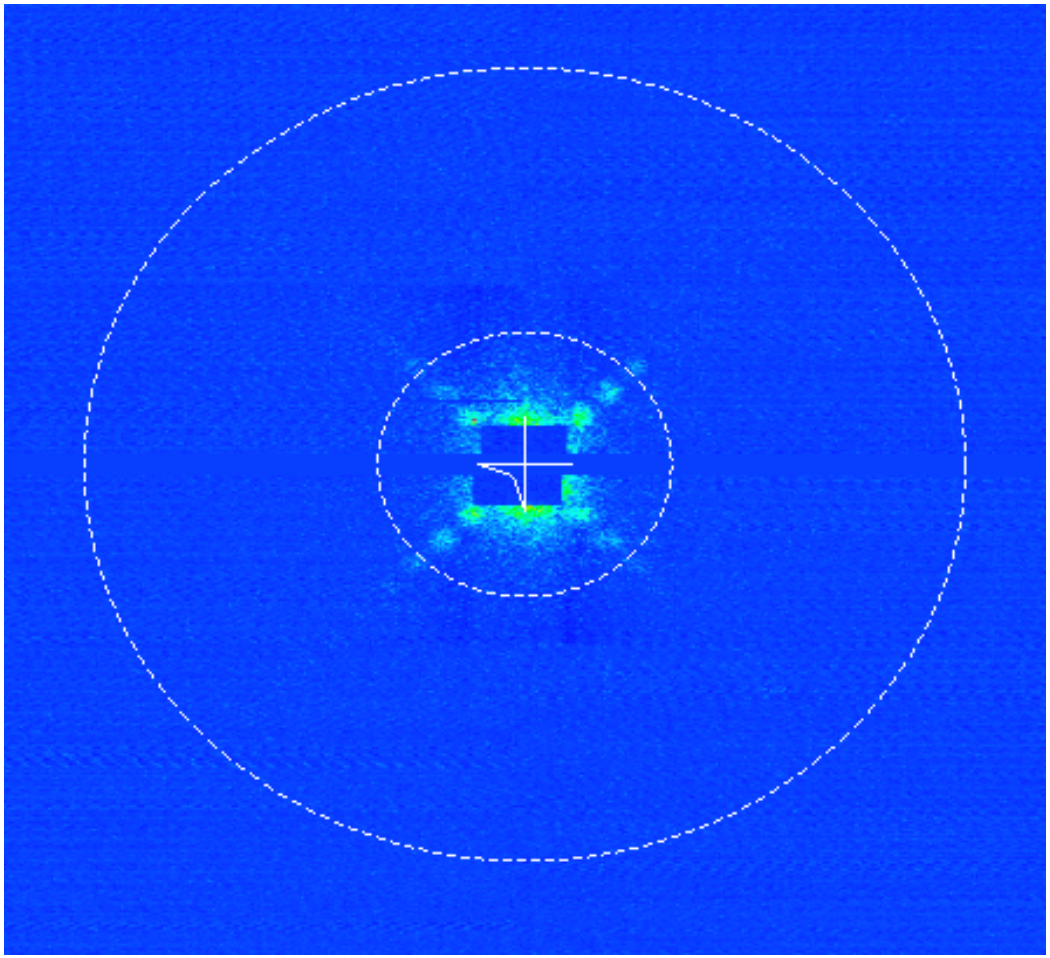
Corresponding quads in –x, viewed from back of detector

Back Detector Gap: Run 159

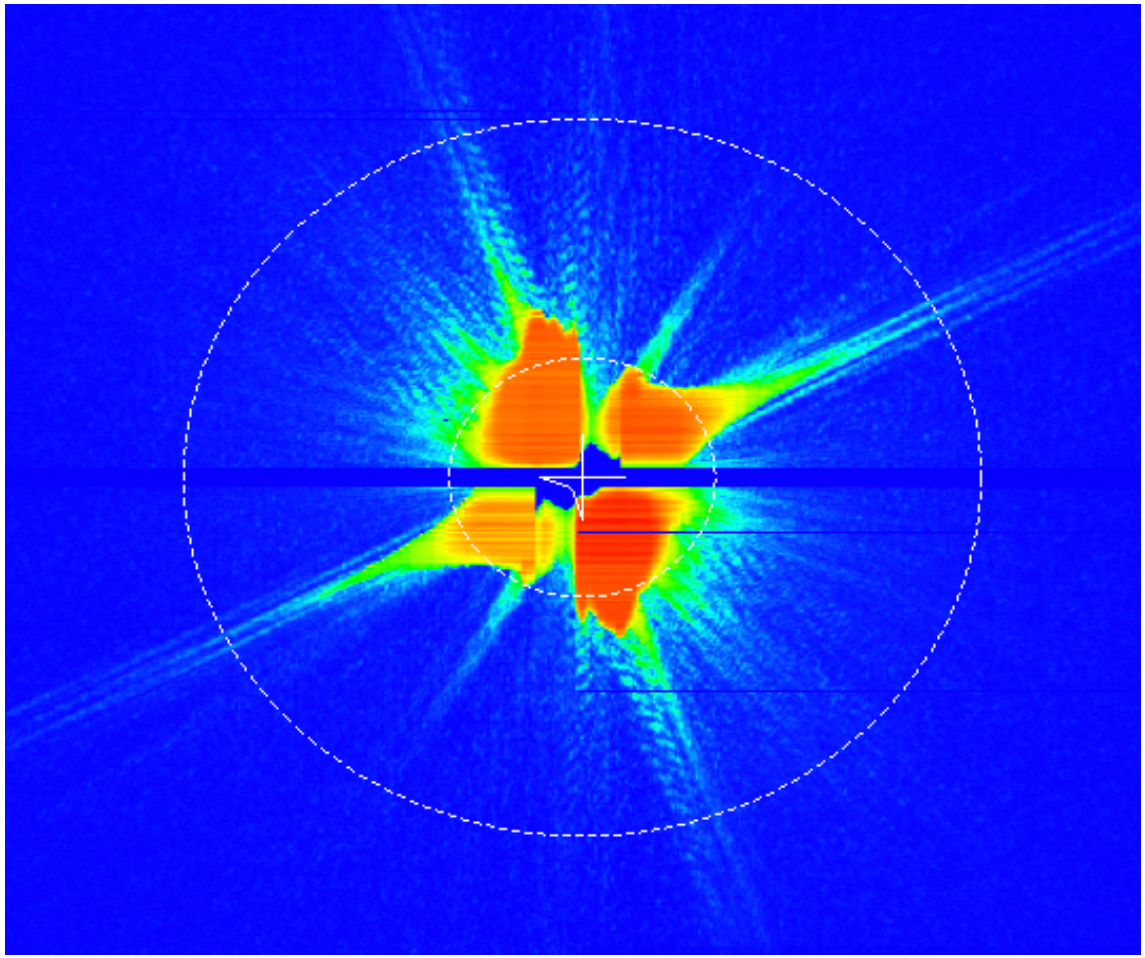
- Timestamp: 617896276219870813 8
- fiducial: 0xf762



Back Detector Gap: Nano-K from Run 17 Shot 14



Back Detector Gap: Nano-K Run 86 Shot 2



Determining CsPad Orientations

- Matt says AMI shows the detector as viewed from the “front” for both cspad and cspad2x2.
- This is cxi02316 run 33 “max value” in psana (left) and a single event in AMI (right). There is only a 90-degree rotation, so psana also views it from the front, by default. 2x1 number “zero” has it’s first 20 pixels highlighted in white (lower-left corner of psana plot). These are read out interleaved with 2x1 number “one”.
- Note that there are no rotations about y in the psana-geom file (and Matt says AMI ignores these anyway)