During May 2018, a new mirror (similar to the one before) was installed. This is the 2nd of the similar mirror procured from InSync. This one is full silicon with no coating on it.

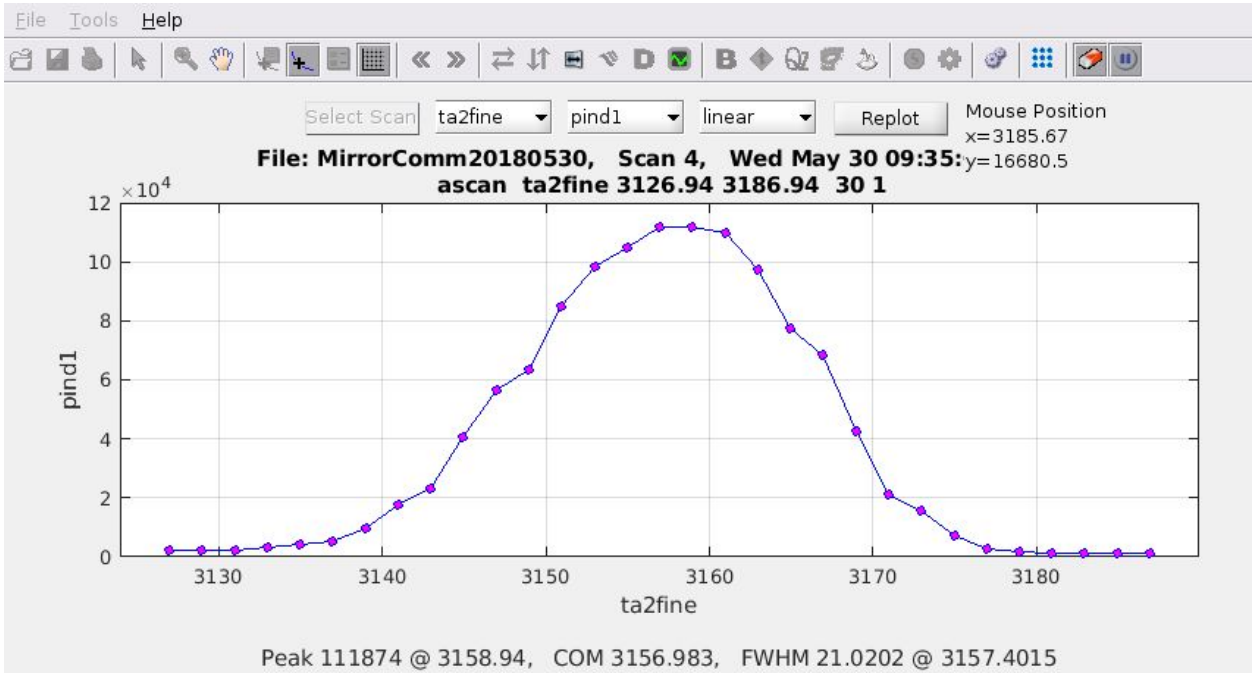
Survey docs to go here:
Scott Wesling (Weasel) checked the old mirror co-ordinates and put the new mirror with the same co-ordinates. Mike Fisher did the real installation.

Details…..

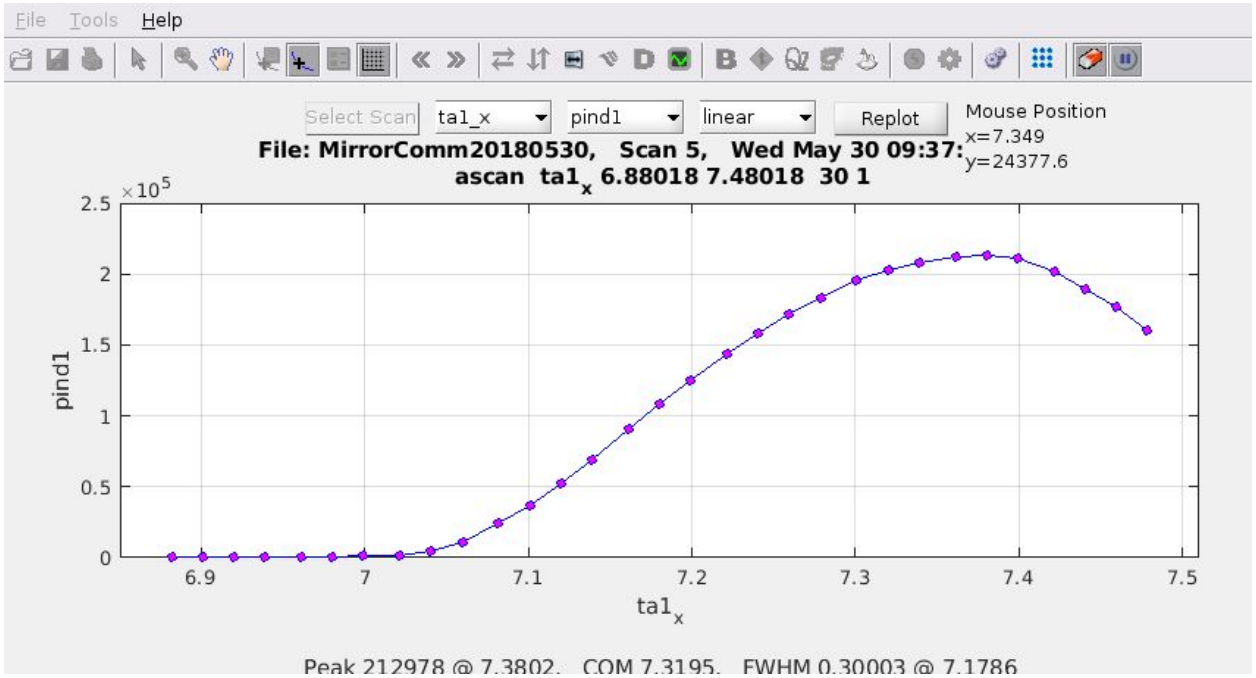
Starting to align with two undulators: 23.72 mm (US) and 23.75 mm (DS)
monoE was at 10.915 keV after homing/.

Si-1 is open to 3 mm (h) x 5 mm (v)
Pink slit is 1 mm (h) x 5 mm (v)
Si-4 was replaced with silicon blades

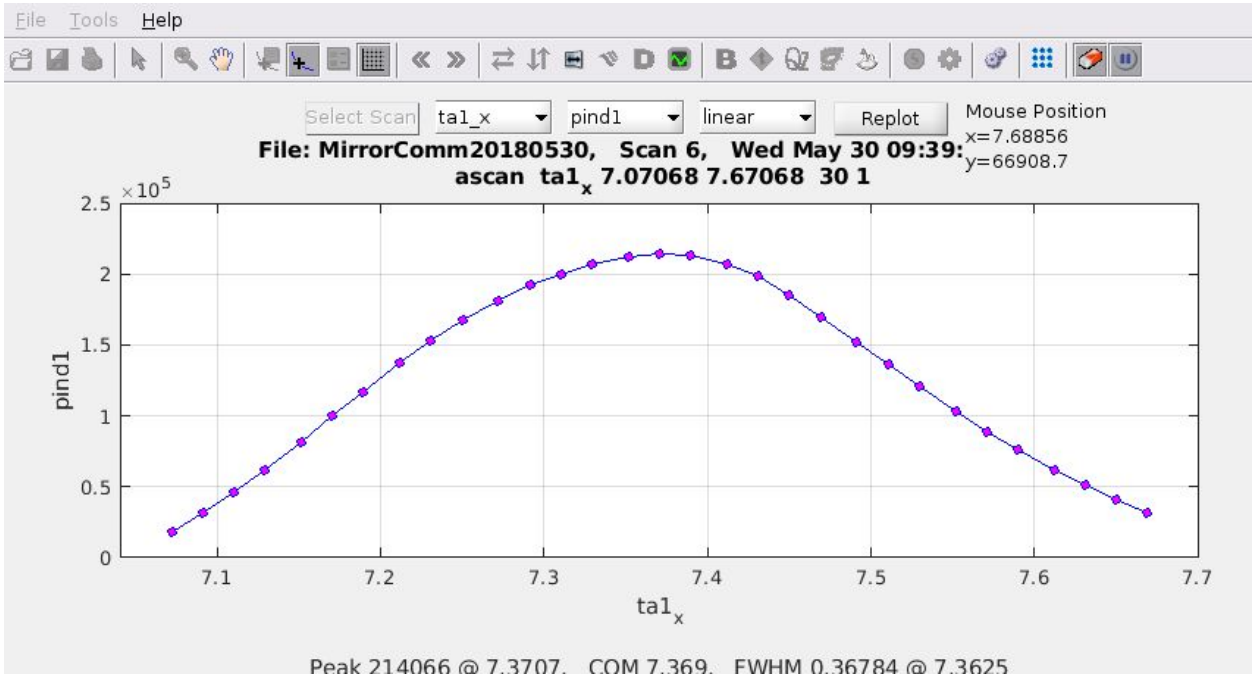
A faint beam was seen right away: pind1 went from 990 to 1010 cps.
Scanned ta1_x and ta1_z
Tweaked ta2fine by 50-100 microrad to see a lot of counts



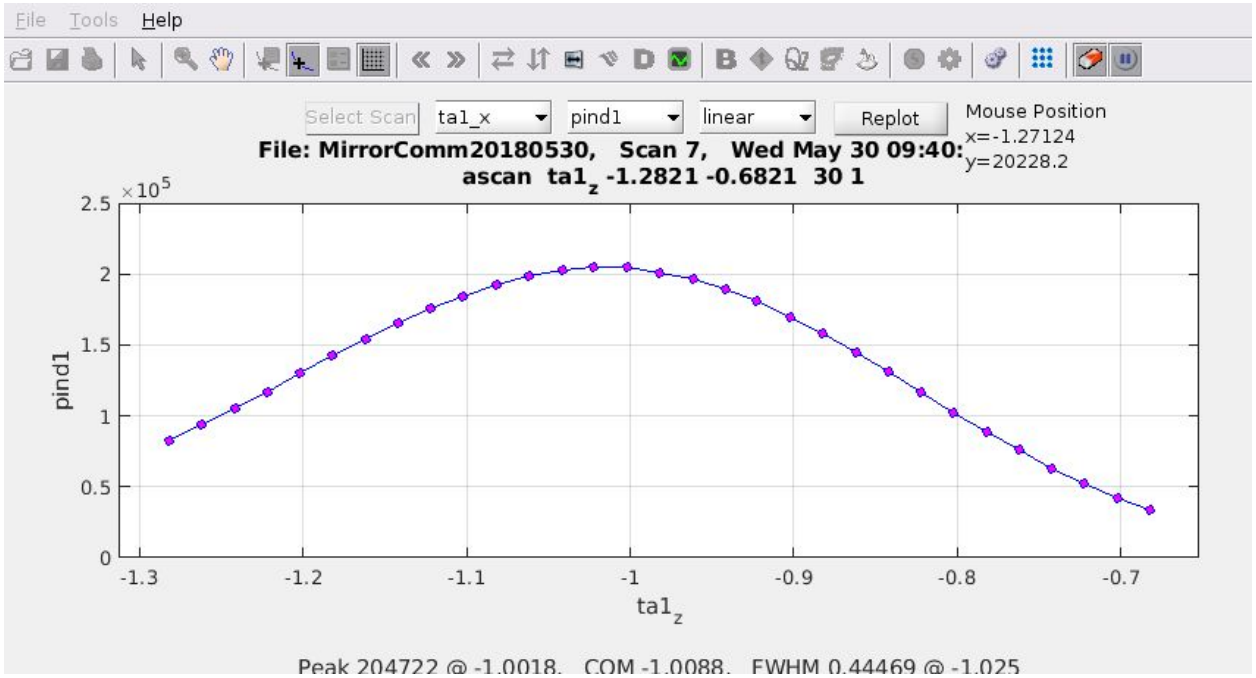
Scanning ta1_x for pinhole in x:



Another scan after centering:



Scanning pinhole in z:



Tweaked ta2fine to maximize flux on pind1:

flux pind1 217e3

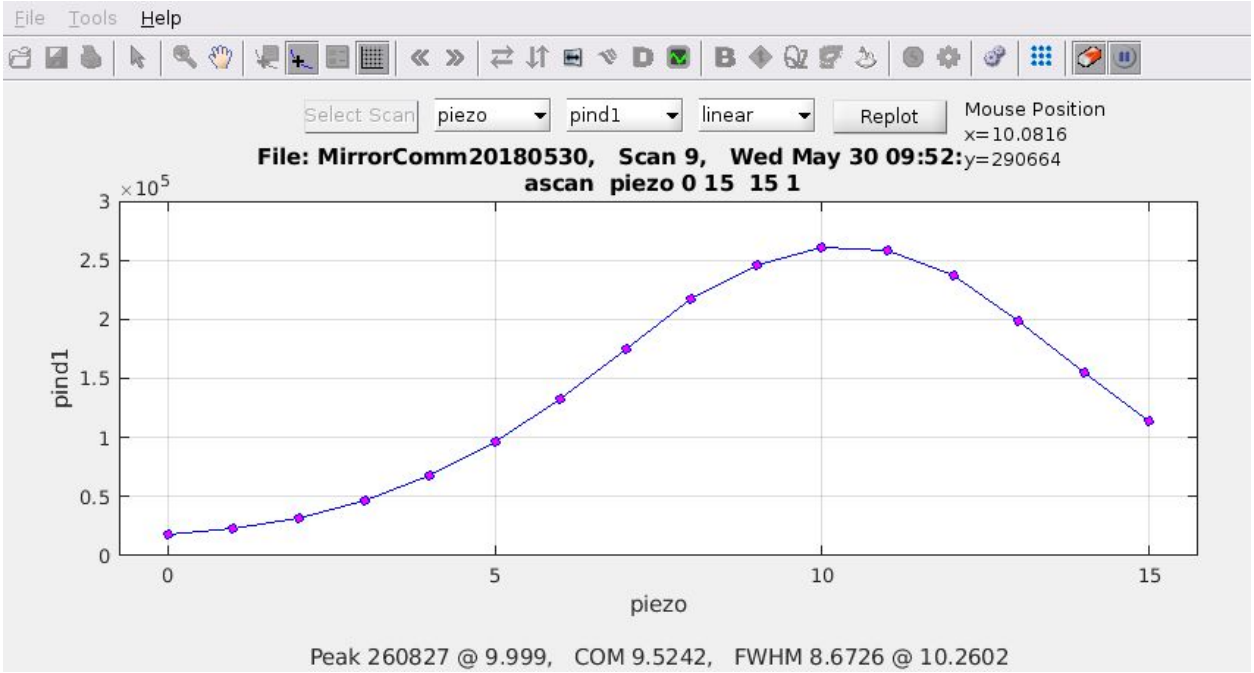
Detector = 1
Amps_per_Volt(pind1) = 0.001 A/V
CtpV = 100000
Length = 0.0400 cm
Element = Si
Ephot = 10915 eV
Si Elength = 0.018 cm

217000 cps is a current of 0.00217 Amps

5.02e+12 photons per second

monoE:
monoE nominally at 10.910 seems good.

Align piezo:



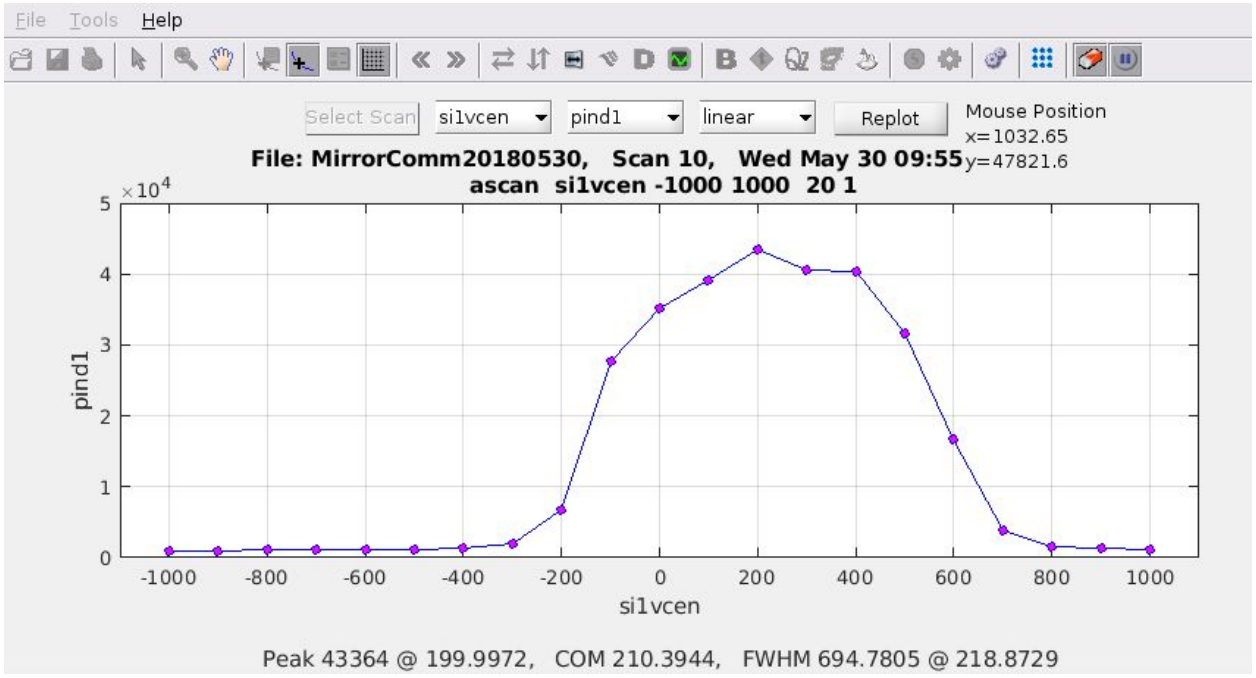
flux pind1 261e3

Detector = 1
Amps_per_Volt(pind1) = 0.001 A/V
CtpV = 100000
Length = 0.0400 cm
Element = Si
Ephot = 10910 eV
Si Elength = 0.018 cm

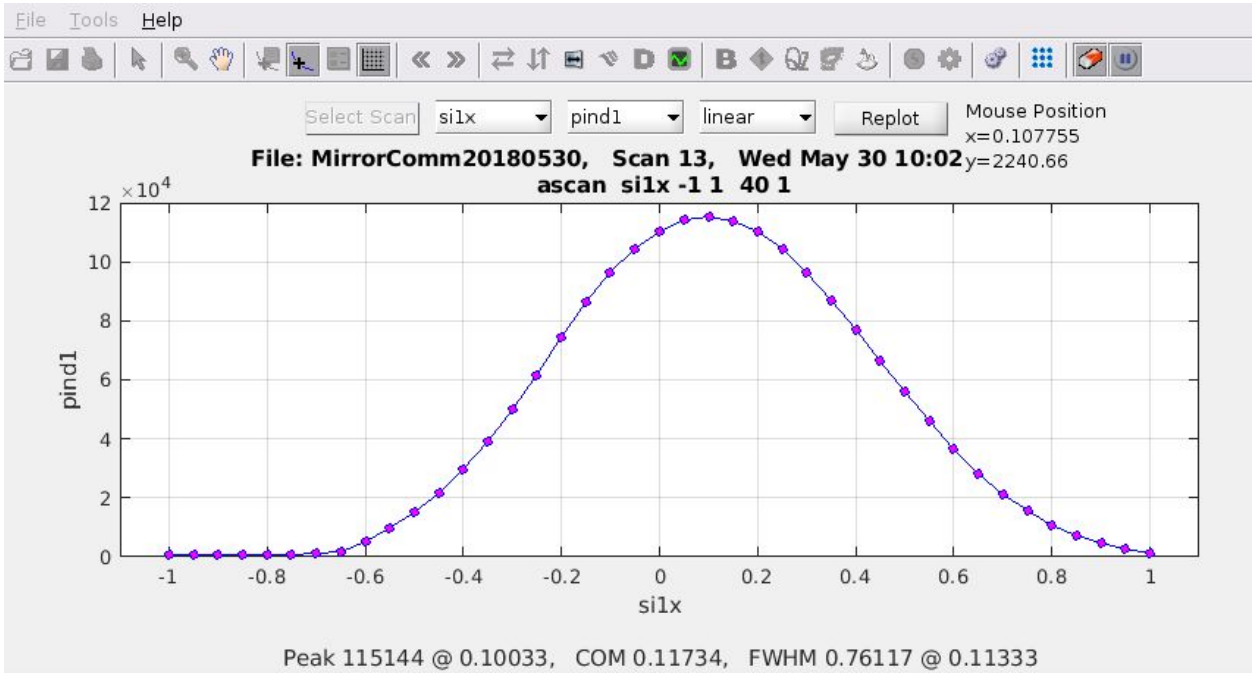
261000 cps is a current of 0.00261 Amps

6.03e+12 photons per second

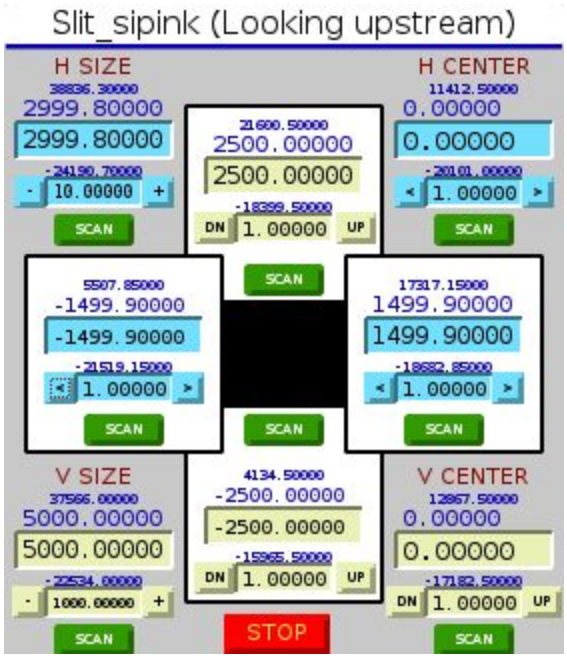
Let us now close the slits to check the flux:
Centering si1 vcen:



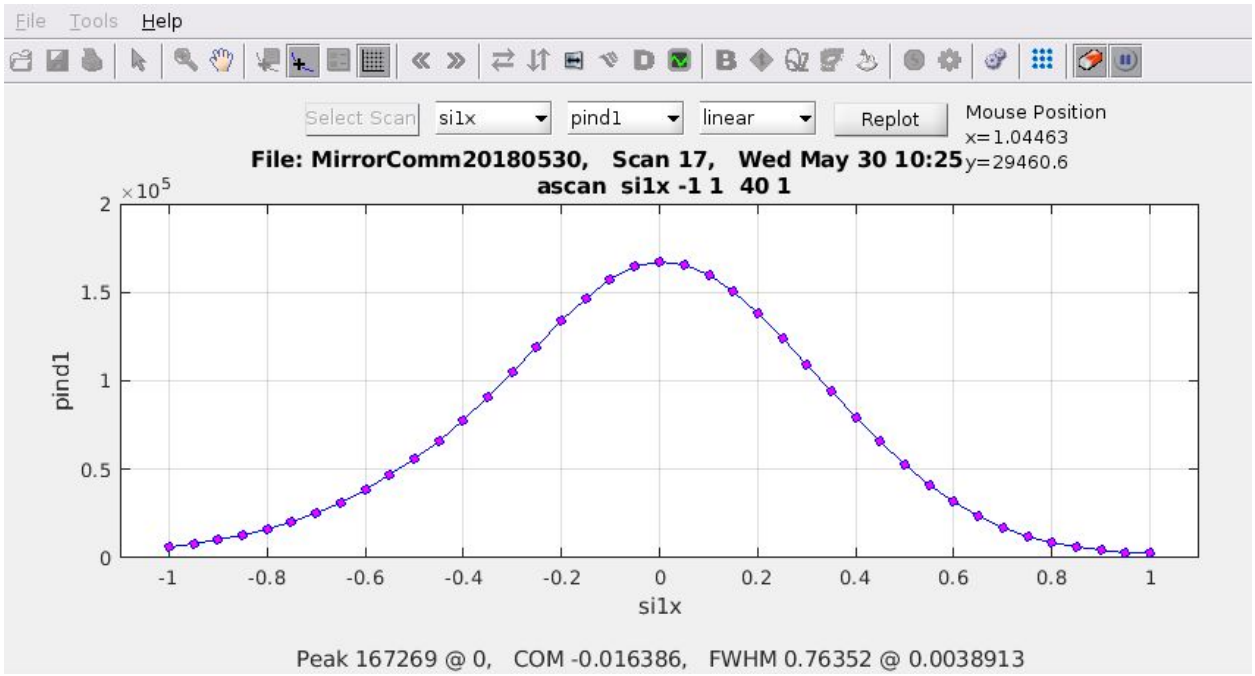
Scanning si1x for si1 hcen:

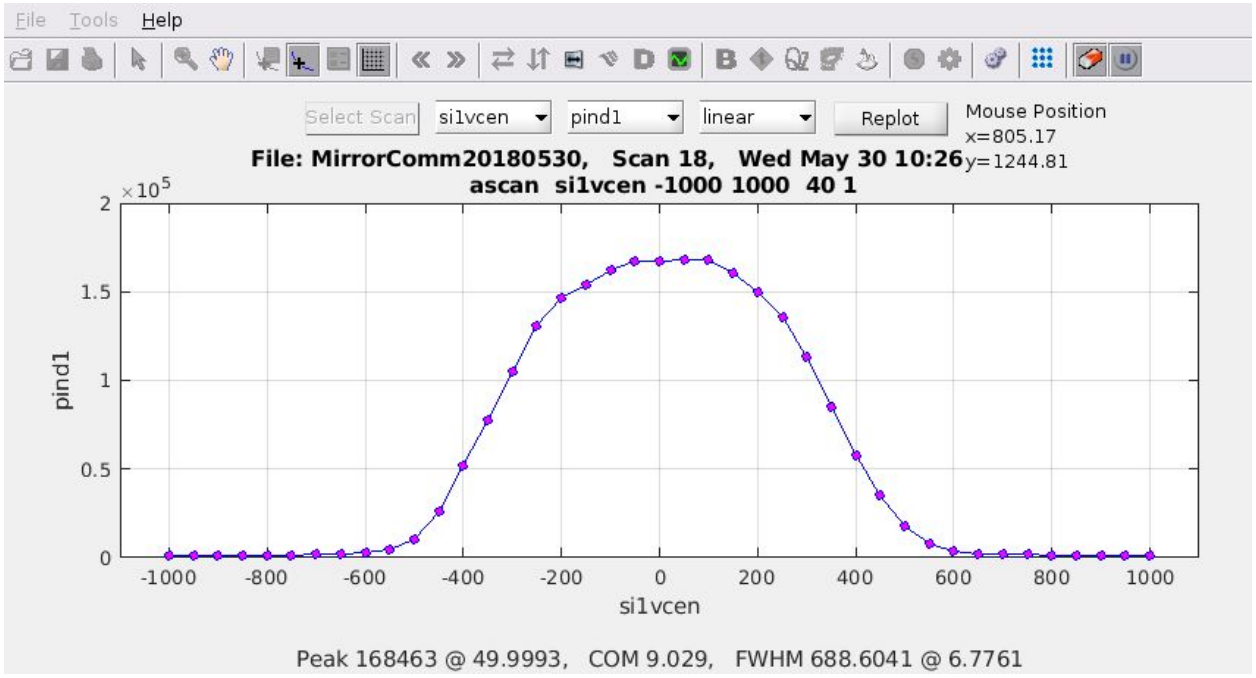


Opened up pink slit in the horizontal to 3 mm



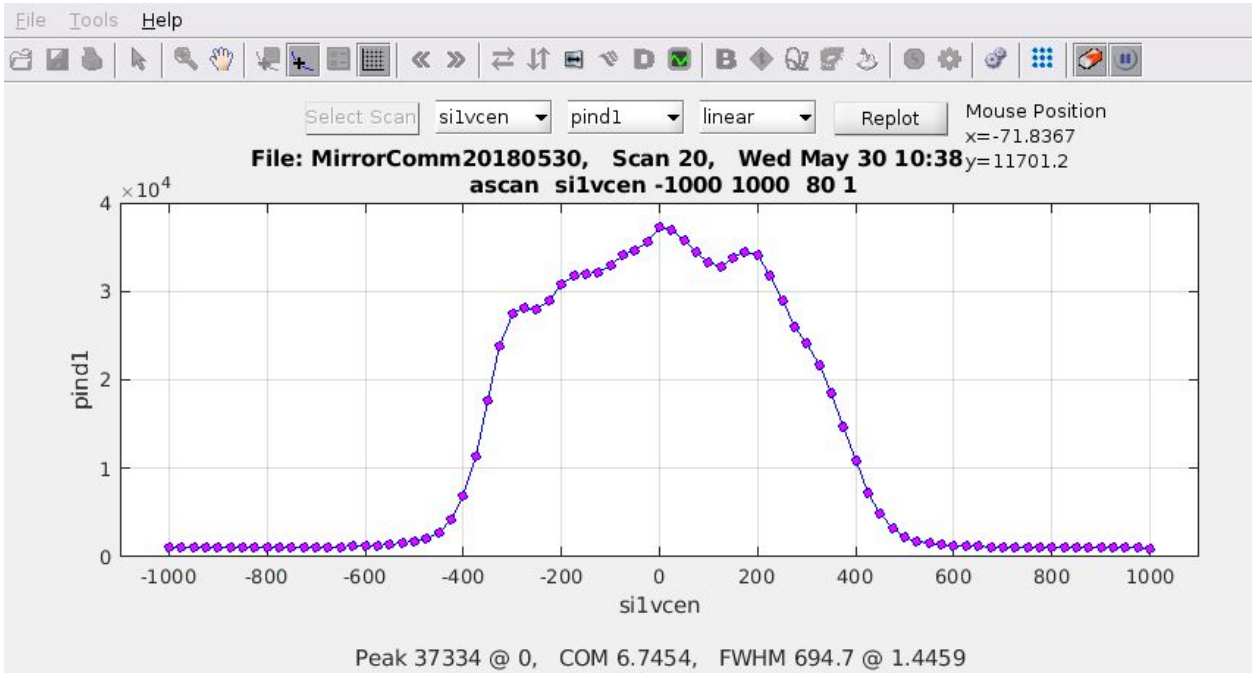
Set si1 to 250 x 250
Slowly steered the beam through si1x=0 using ta2fine.



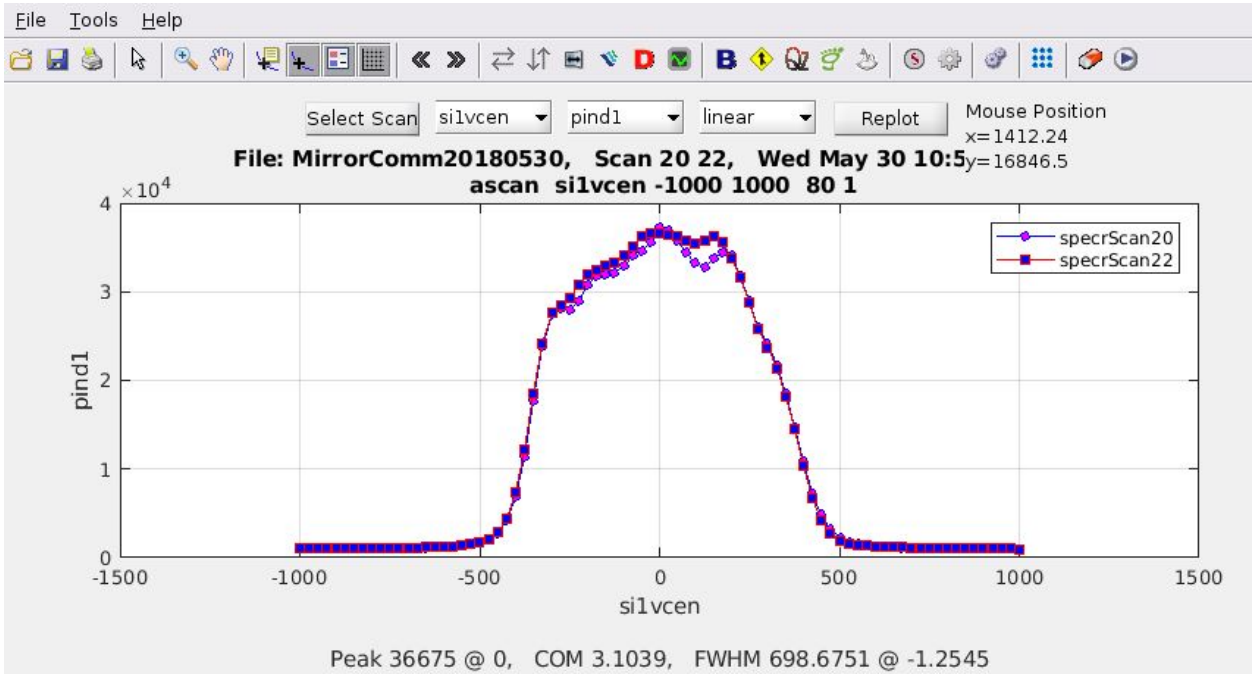


Now scan in vertical with a small slit 50 um:

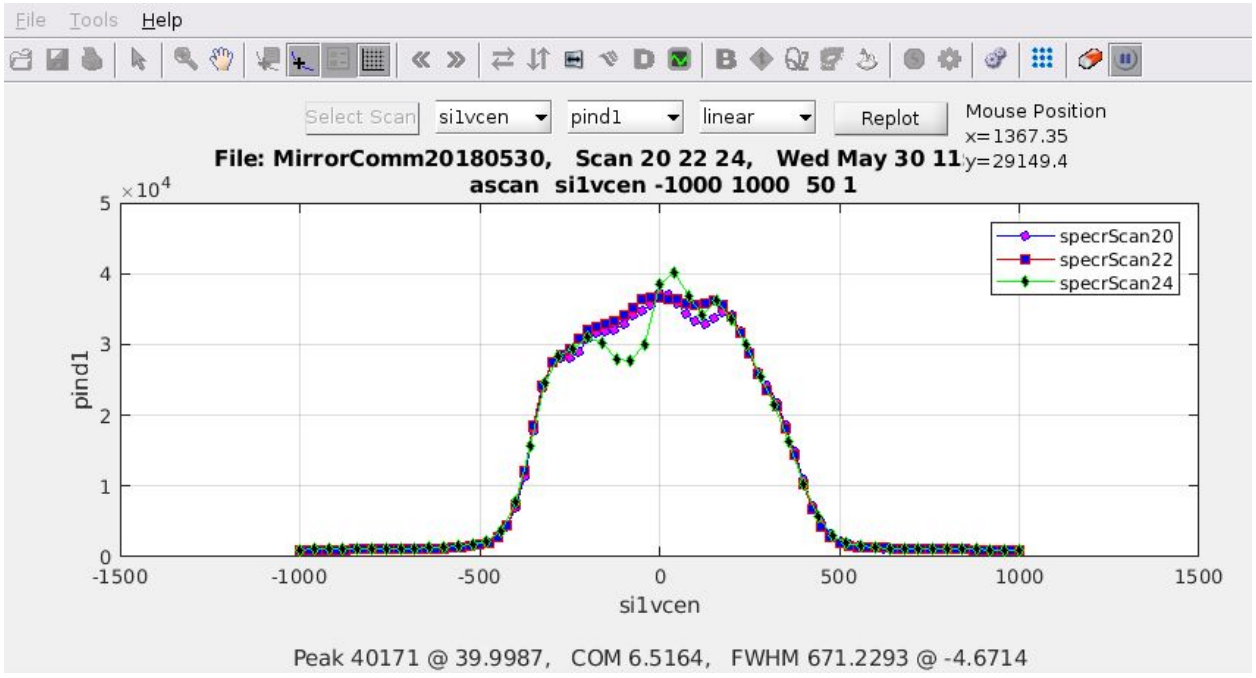
Scan si1vcen with ta2_z @ 0.00 mm



Overlay of 0 mm and 0.5 mm ta2_x (scans 20 and 22)



Scan 24 is at ta2z=1.0



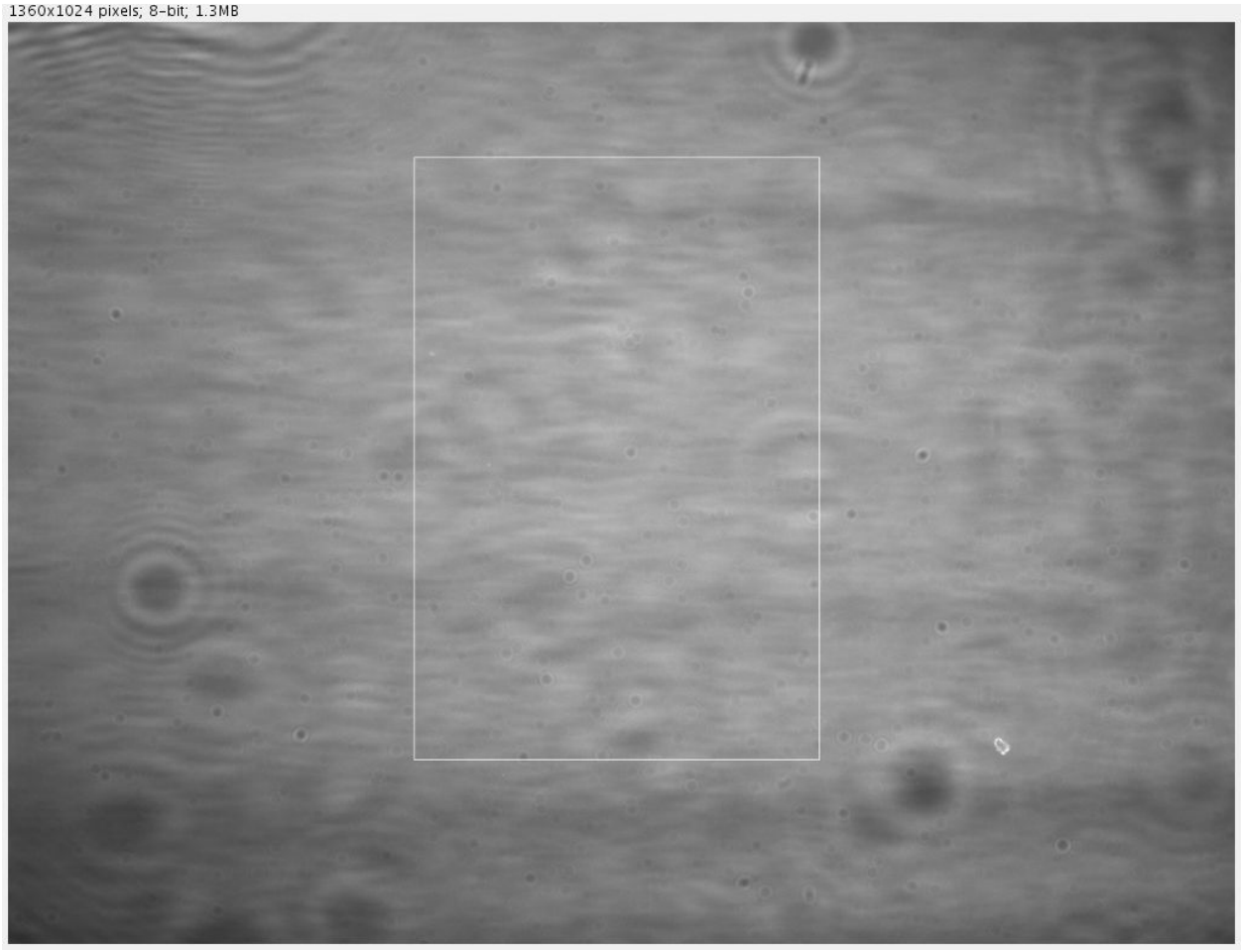
Zhang suggested to go to Prosilica

Lining up the slit centers nominally. Gaps still need to be done later.

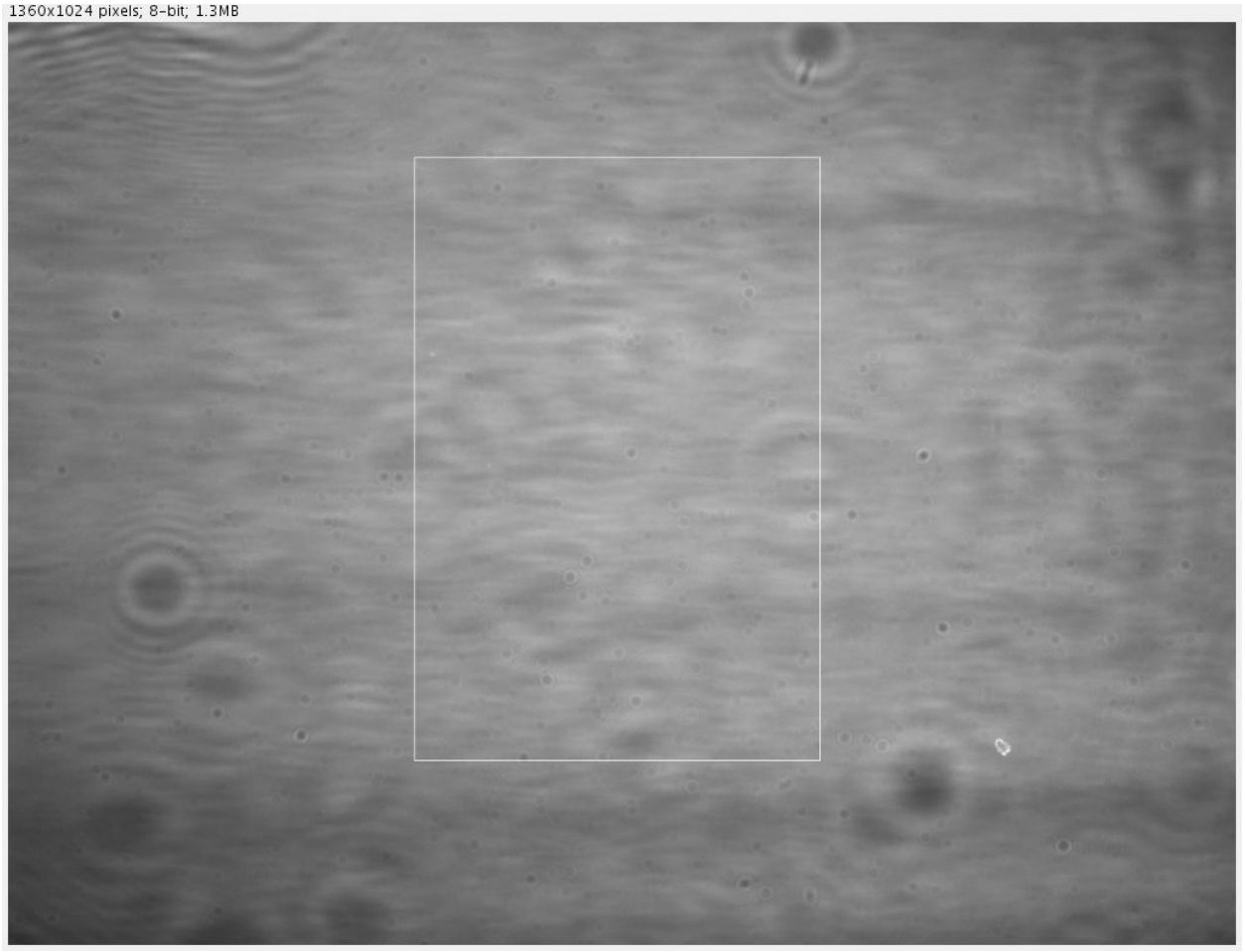
Beryllium Window:

Looking on prosilica:
Bewinx has good regions between -4.9 and -5.1
Bewinx was at -5.5 and Bewinz was at -9.0 till the end of 2018-1 cycle

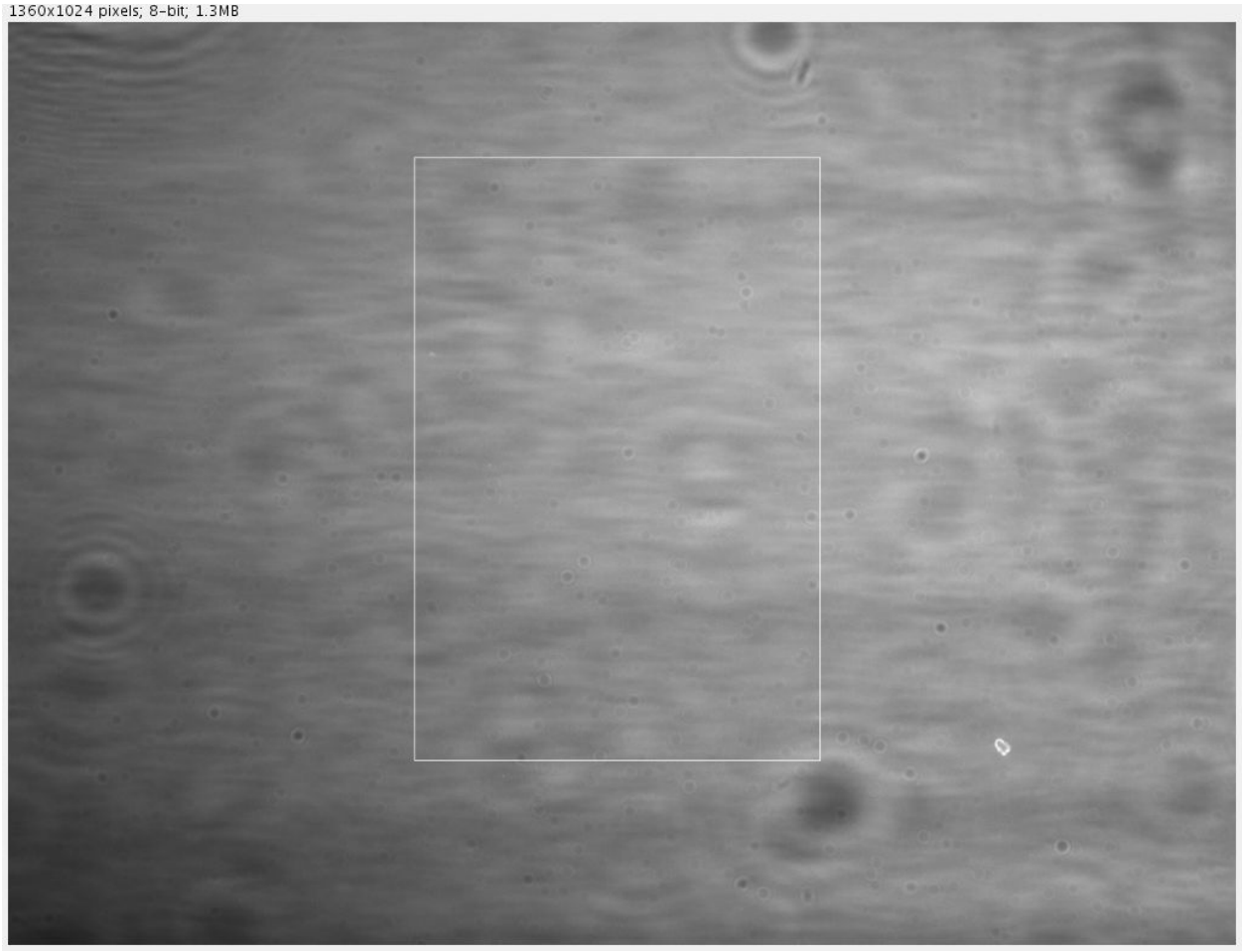
ta2_z= -2.5



Ta2z at -2



ta2z=-1



Banded regions in the Mirror profile:

Ta2z at +1.0 shows bands

Other than this one spot at ta2z= +1.0, the region around +/- 3 mm look good. 0 mm is the nominal center of the mirror.
May be go in the -ve direction from here:

Set ta2z to 0.0

Si1 250 x 250
No diamx in the beam
flux pind1 167e3

Detector = 1
Amps_per_Volt(pind1) = 0.0002 A/V
CtpV = 100000
Length = 0.0400 cm
Element = Si

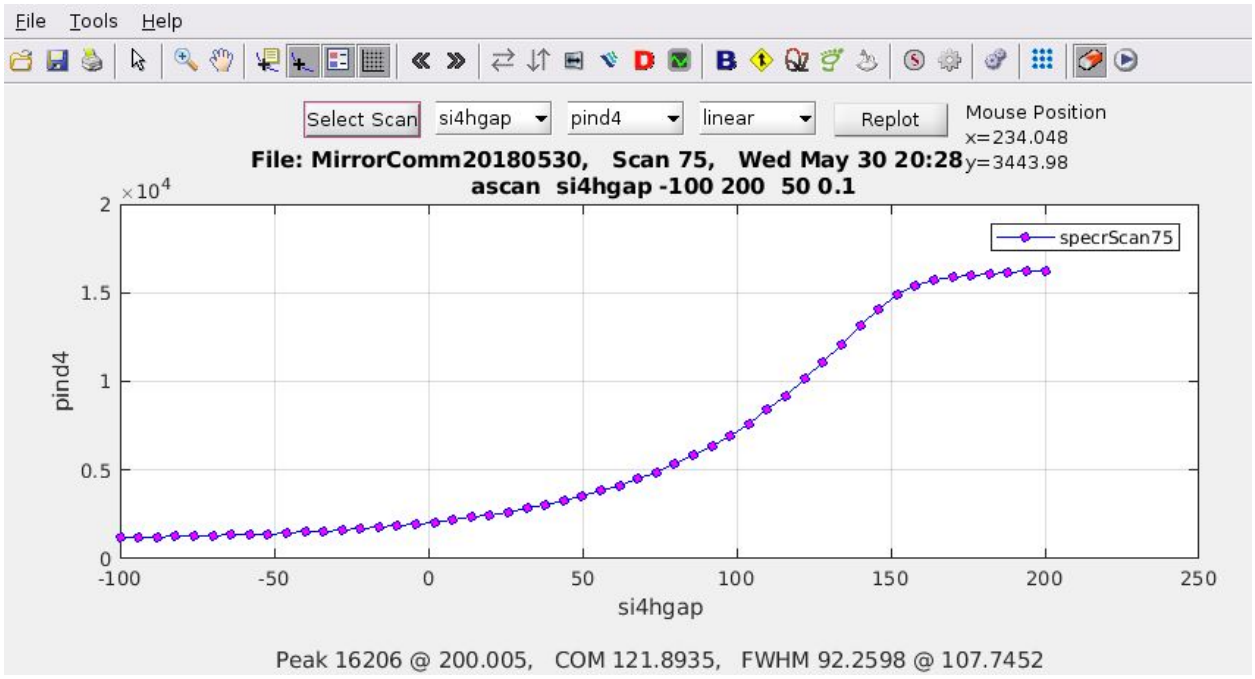
Ephot = 10910 eV
Si Elength = 0.018 cm

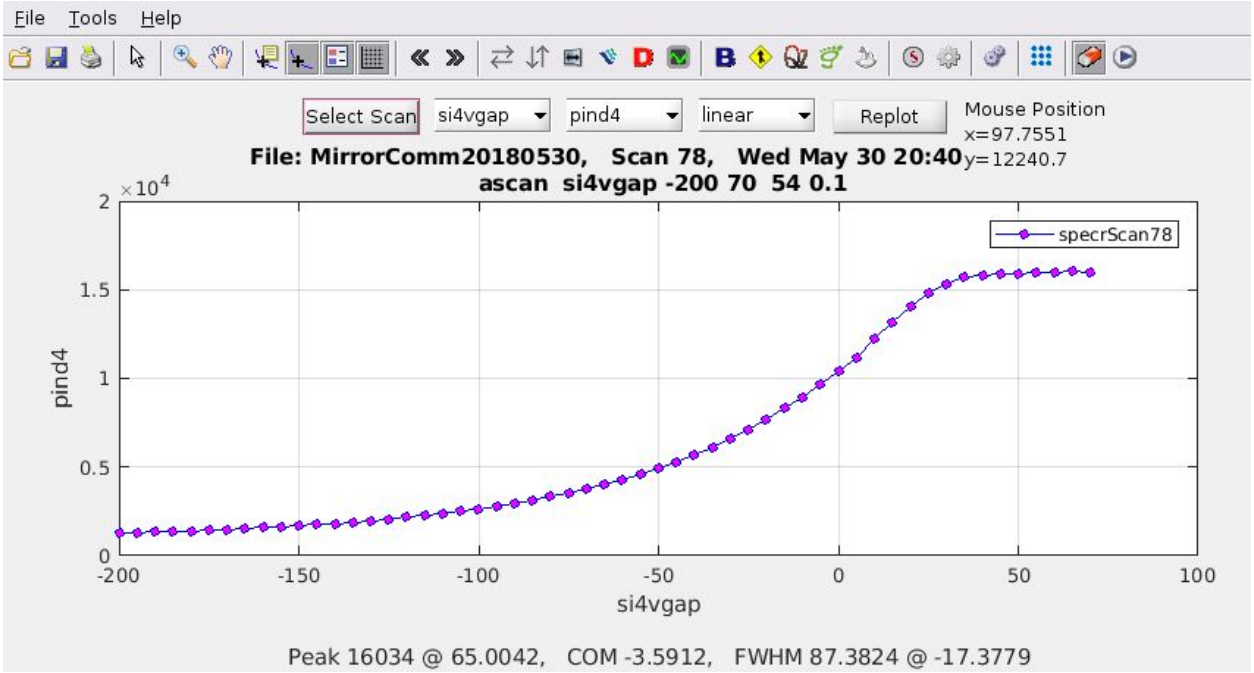
167000 cps is a current of 0.000334 Amps

7.72e+11 photons per second

Putting diamx in the beam and aligning:

Centering slits:
Note that both si4 and si5 are soft silicon slits



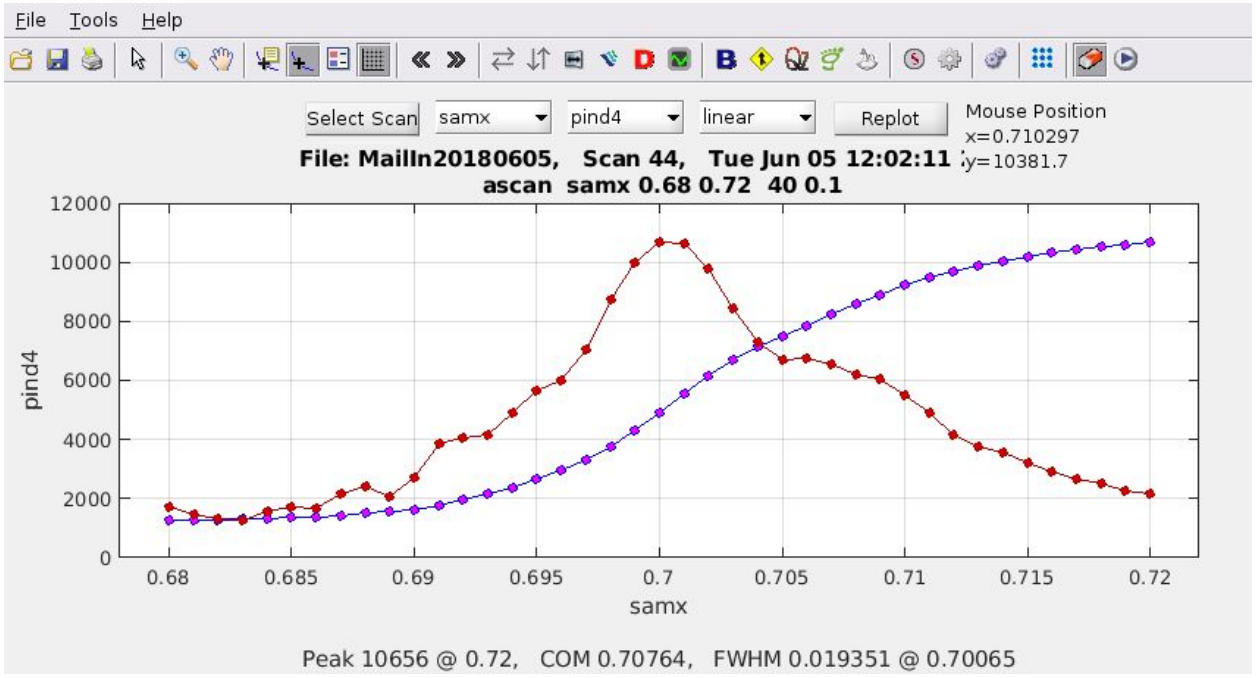


%%%%%%%%%%%%%%%%%%
Start of 2nd week of the run:

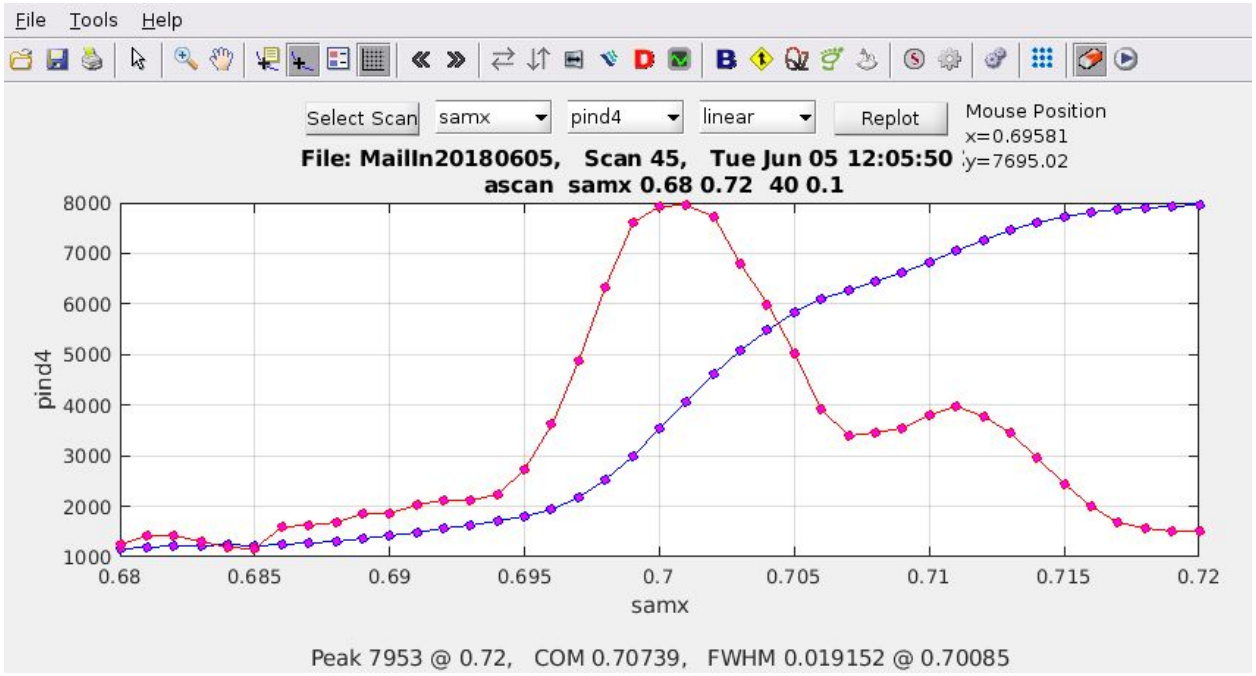
Try si3 as the beam defining slit, parasitic clean up with si4 and si5 seems good, both silicon soft slits

Eric's Knife edge scans to check the beam size at the sample location:

With 20 um horizontal slit in si3



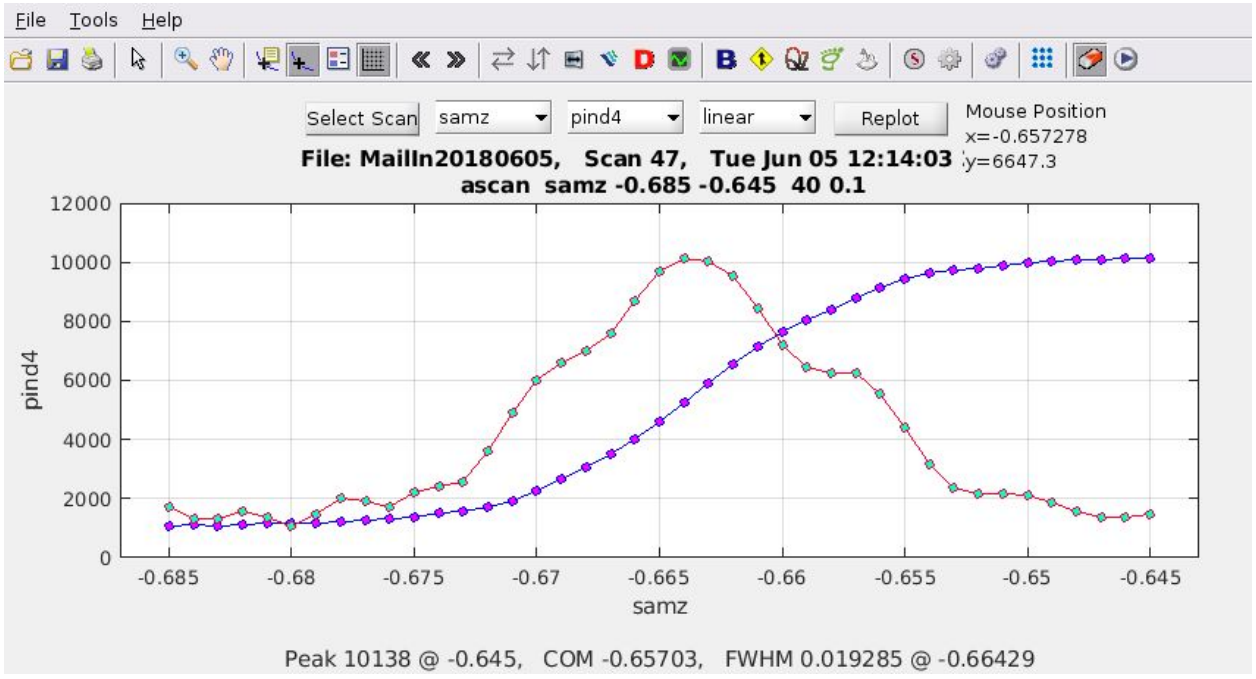
With 15 um horizontal slit in si3



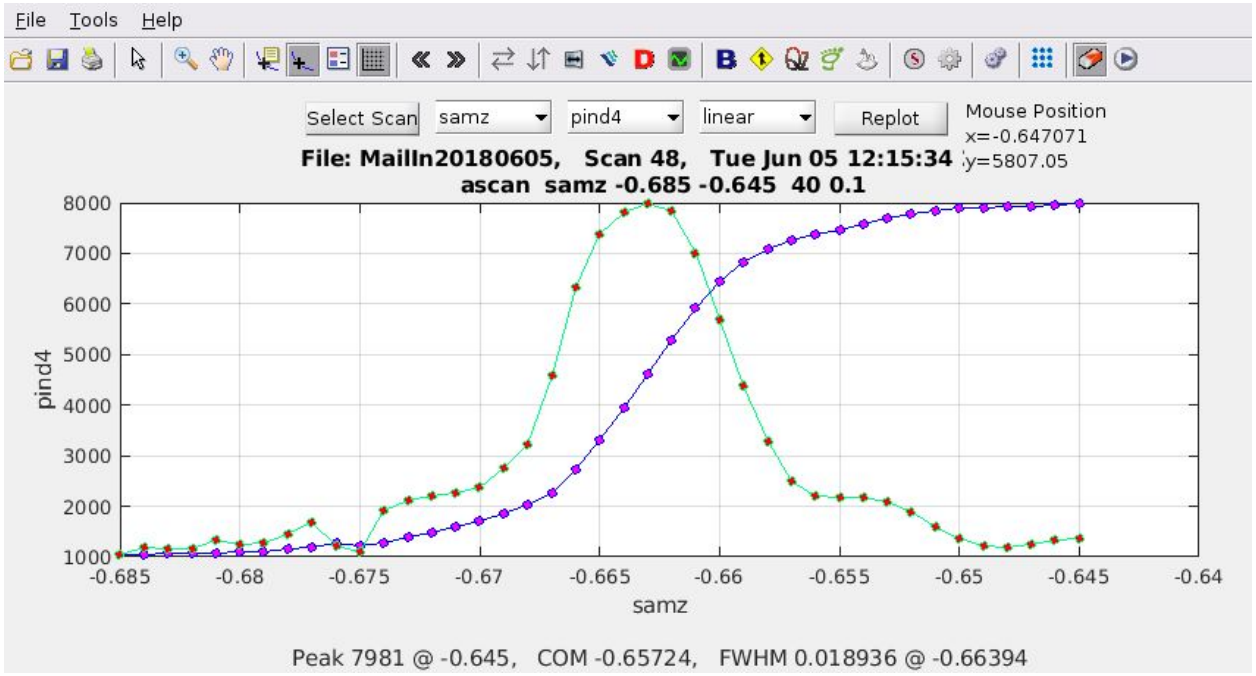
The diffraction broadening seems ok, about 15-16 um
Shape is not great with 20 um or 15 um, presumably due to the heat bump on the mono crystal

Let us check the vertical now:

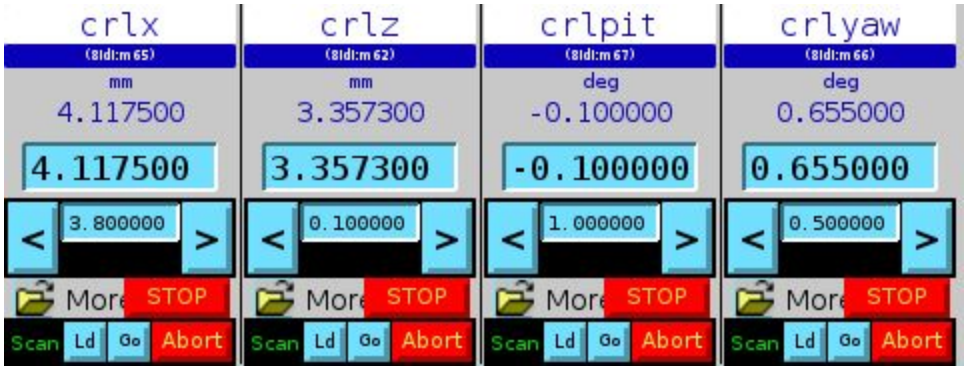
With 20 um vertical slit in si3

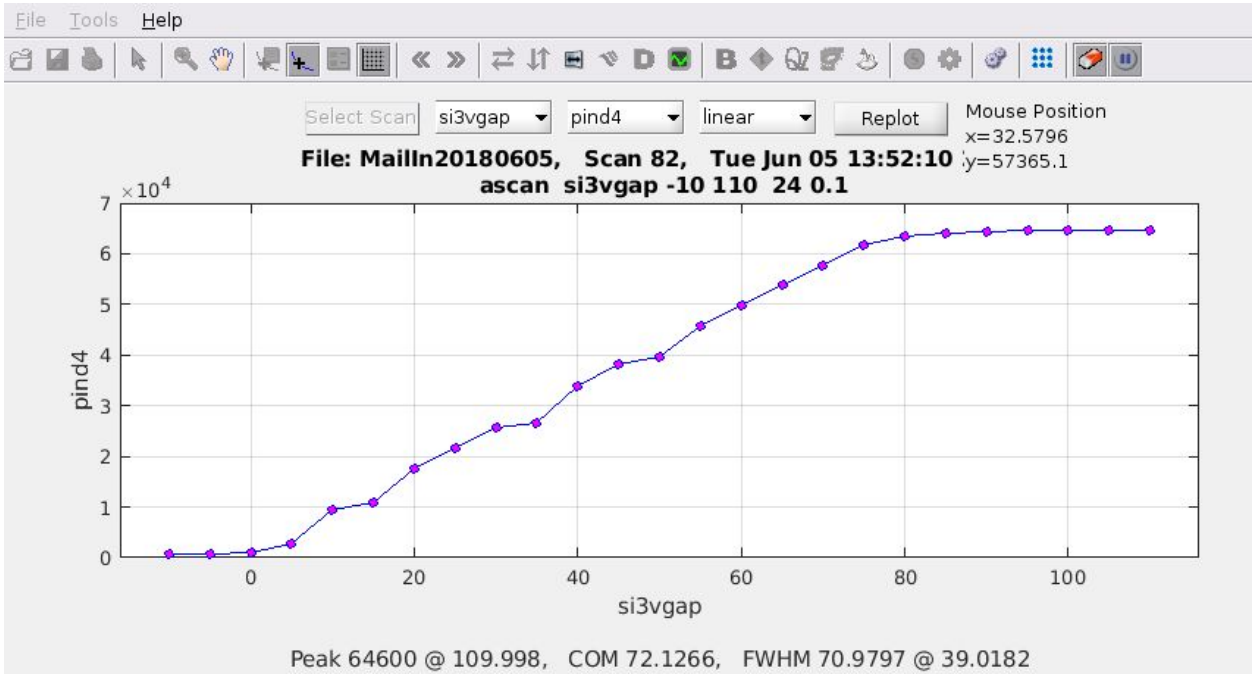


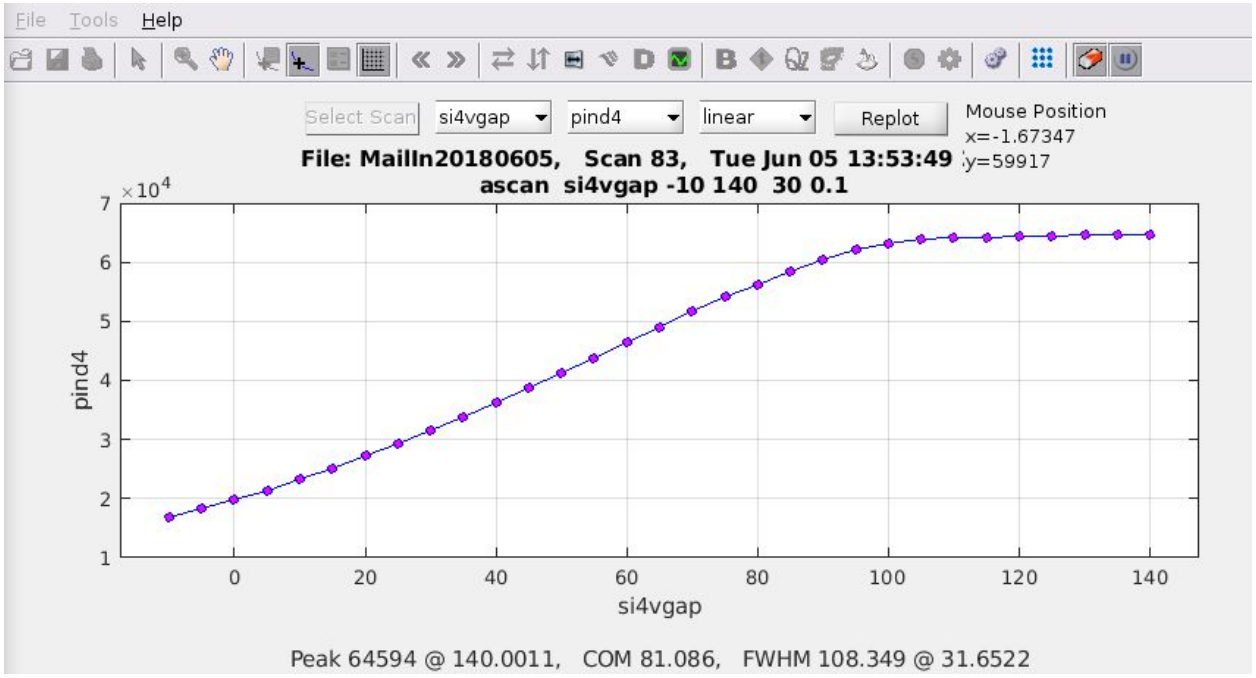
With 15 um vertical slit in si3

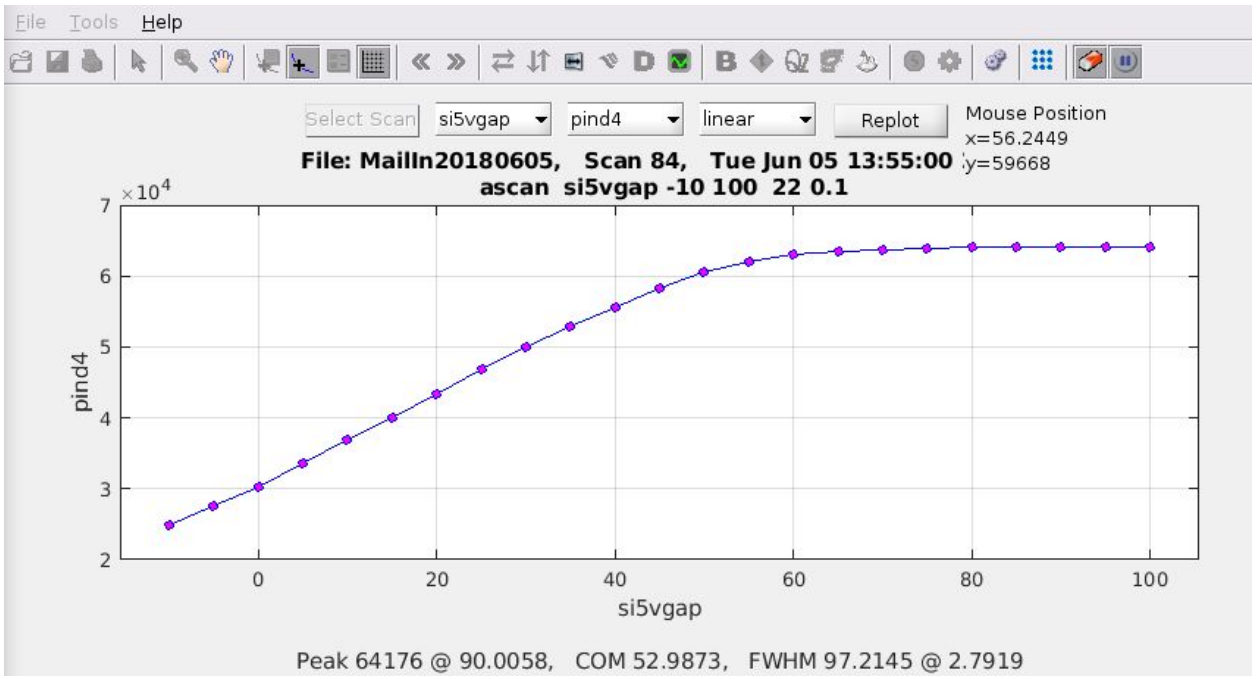


Try vertical focusing: (Note there are 15 lenses, supposed to give close to 10 um at the sample)






File Tools Help
Select Scan
si4vgap
pind4
linear
Replot
Mouse Position
x=-1.67347
y=59917
File: MailIn20180605, Scan 83, Tue Jun 05 13:53:49
ascan si4vgap -10 140 30 0.1
×10^4
pind4
si4vgap
Peak 64594 @ 140.0011, COM 81.086, FWHM 108.349 @ 31.6522


File Tools Help
Select Scan
si5vgap
pind4
linear
Replot
Mouse Position
x=56.2449
y=59668
File: MailIn20180605, Scan 84, Tue Jun 05 13:55:00
ascan si5vgap -10 100 22 0.1
×10^4
pind4
si5vgap
Peak 64176 @ 90.0058, COM 52.9873, FWHM 97.2145 @ 2.7919

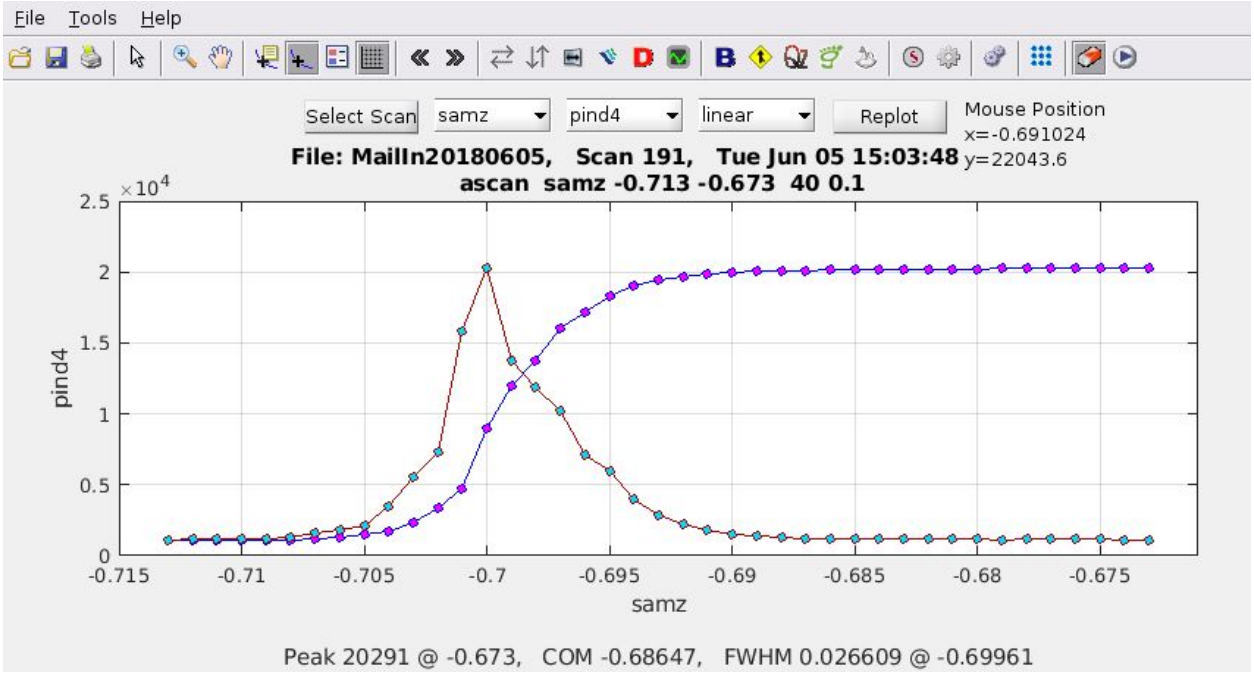
flux pind4 97e3*6.831435

Detector = 5
Amps_per_Volt(pind4) = 1e-06 A/V
CtpV = 100000
Length = 0.0400 cm
Element = Si
Ephot = 10910 eV
Si Elength = 0.018 cm

662649 cps is a current of 6.62649e-06 Amps

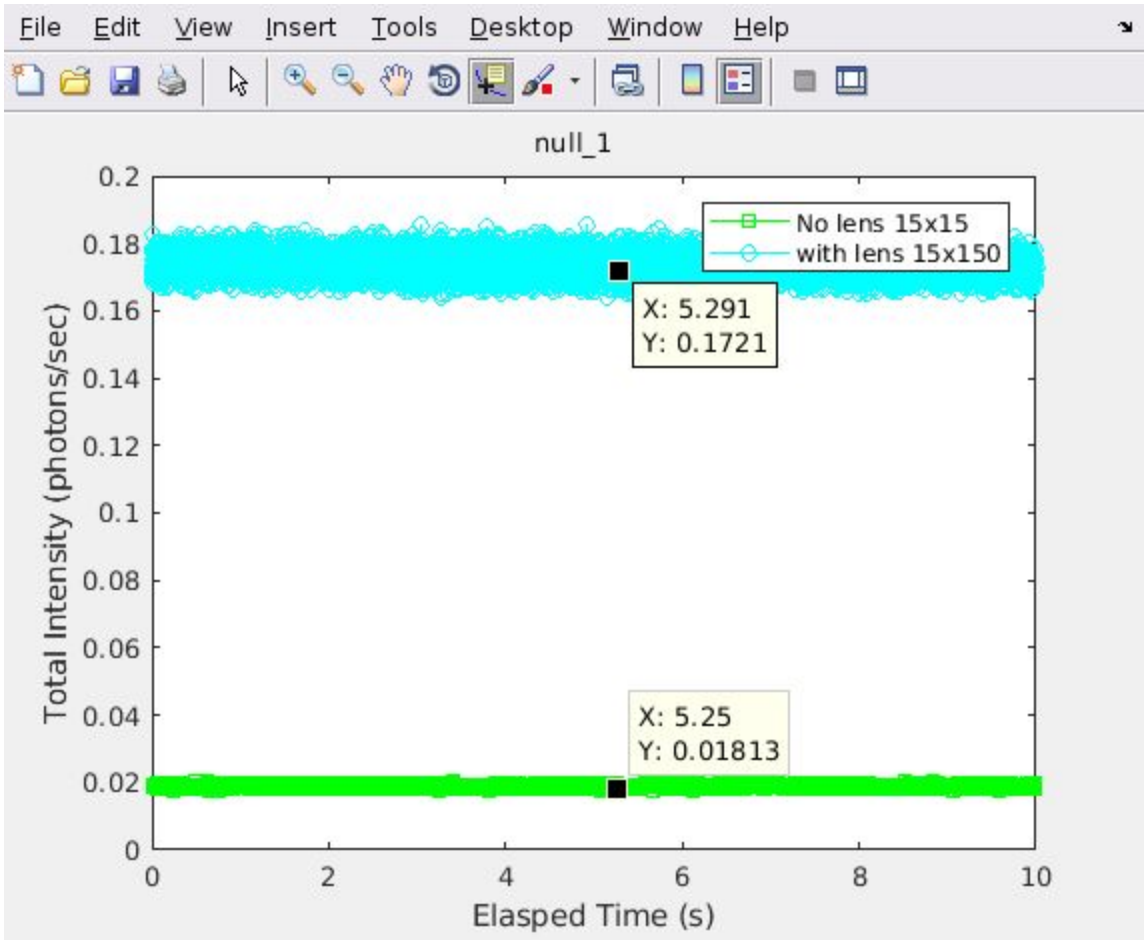
1.53e+10 photons per second

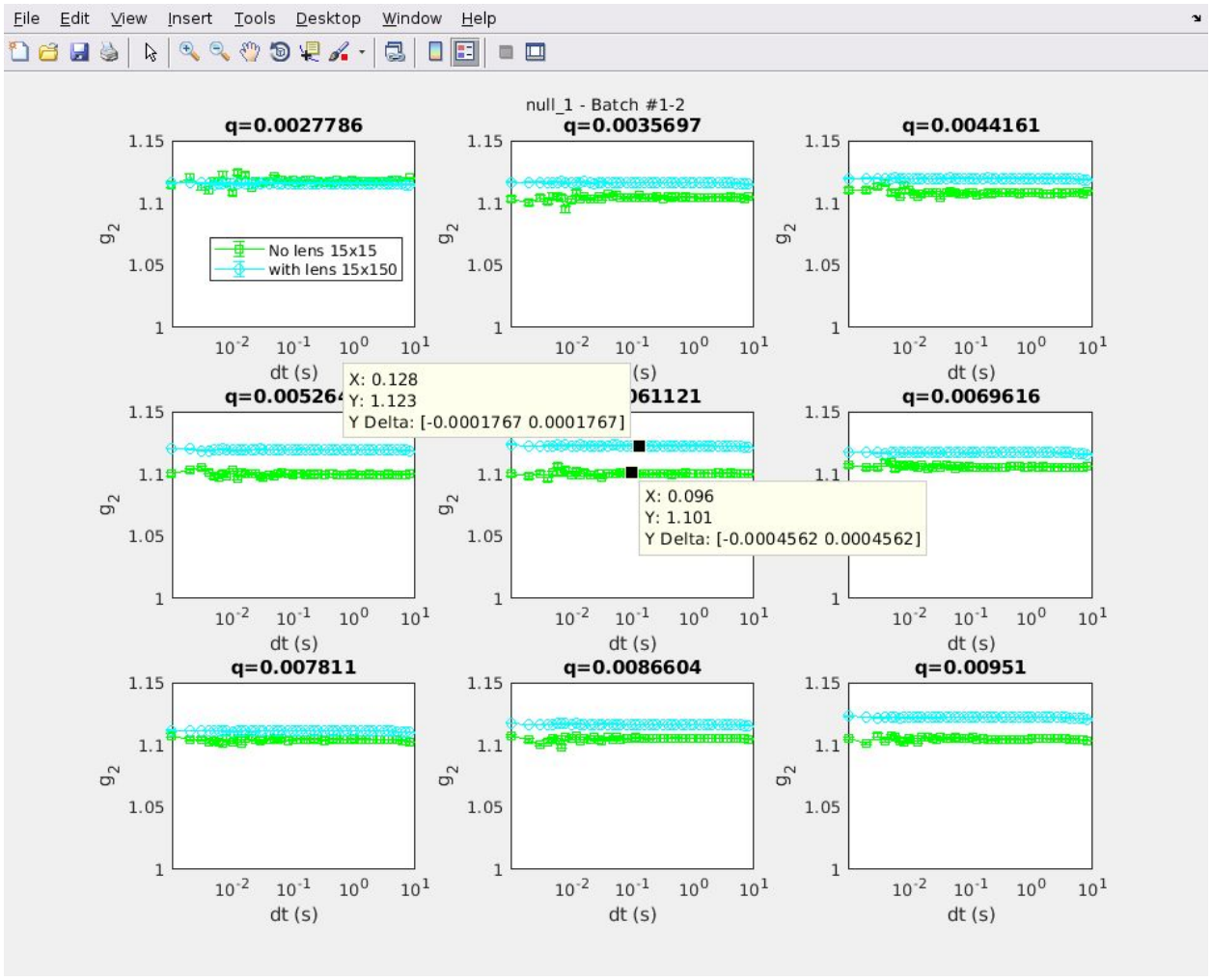
Knife edge scan in the vertical:

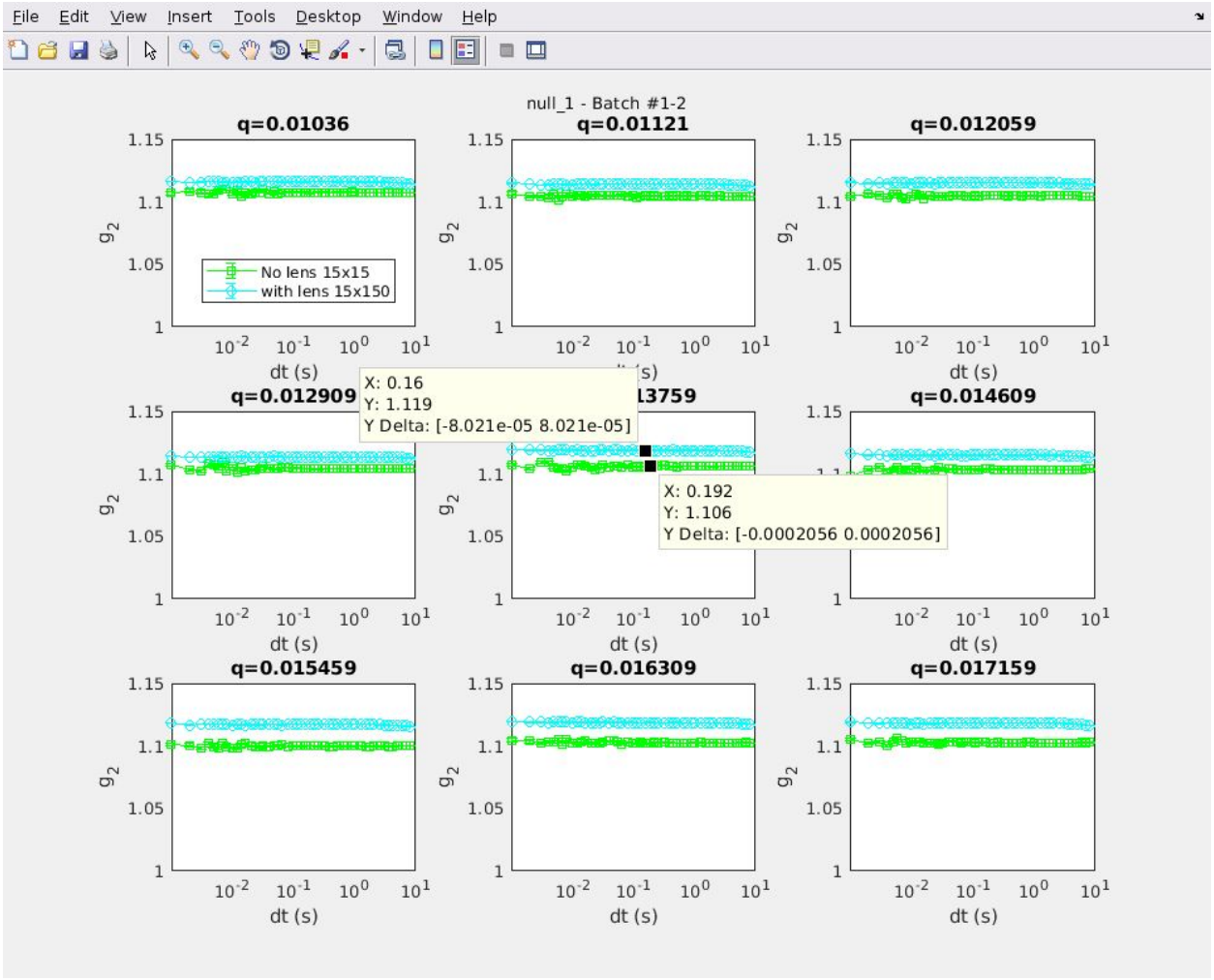


Not all spots on the knife edge are good.

Seems like 10-11 um or so as expected.


File Edit View Insert Tools Desktop Window Help
null_1
No lens 15x15
with lens 15x150
X: 5.291
Y: 0.1721
X: 5.25
Y: 0.01813
Total Intensity (photons/sec)
Elasped Time (s)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
2
4
6
8
10


File Edit View Insert Tools Desktop Window Help
null_1 - Batch #1-2
q=0.0027786
q=0.0035697
q=0.0044161
q=0.0069616
q=0.007811
q=0.0086604
q=0.00951
No lens 15x15
with lens 15x150
X: 0.128
Y: 1.123
Y Delta: [-0.0001767 0.0001767]
X: 0.096
Y: 1.101
Y Delta: [-0.0004562 0.0004562]
g2
dt (s)



>> ls -1 A*
/net/wolfa/data/xpcs8/2018-2/MailIn201806/cluster_results

20x20 nominal
A001_Aerogel_1mm_025C_att0_Lq0_001_0001-10000.hdf
A002_Aerogel_1mm_025C_att0_Lq0_001_0001-10000.hdf

Tried combinations of 15 um and 20 um with H and V slits
A003_Aerogel_1mm_**15umH_20umV**_025C_att0_Lq0_001_0001-10000.hdf
A004_Aerogel_1mm_**20umH_15umV**_025C_att0_Lq0_001_0001-10000.hdf
A005_Aerogel_1mm_**15umH_15umV**_025C_att0_Lq0_001_0001-10000.hdf
A008_Aerogel_1mm_**15umH_15umV**_025C_att0_Lq0_001_0001-10000.hdf

A011_Aerogel_1mm_**CRL_15umH_150umV_15Lenses_11umFocus**_025C_att0_Lq0_001_0001-10000.hdf

A011_Aerogel_1mm_**CRL_15umH_150umV_15Lenses_11umFocus**_025C_att0_Lq0_002_0001-10000.hdf

Brief conclusion:
With N=14 lenses, we get a focus of 18 um at the sample, contrast of 6% on Lambda. This can be alternated with 20x20 um beam with no focus for the same 6% contrast.

With N=15 lenses, we get a focus of 11-12 um at the sample, contrast of 12% on Lambda. This can be alternated with 15x15 um beam (using si3) with no focus for a very similar but a bit smaller 11% contrast.

N=16 gives the focus on the sample, I believe it is 15% contrast on Lambda with 20um (H) - to be verified from the previous logs. This will 15 um (H) might give 18% contrast.

So here after, my preference would be to use the following conditions:

Set si1 to 250 x 250

Set si2 to 150 x 150 before CRL (this can stay the same always)

Set si3 to 15 x 15 or 20 x 20 as desired without CRL
OR
Set si3 to 15 (H) x 100 (V) with CRL so that si3-H sets the horizontal aperture for the sample.
