UFXC 32k run @ 4/20/18 9h40 AM start or SU

```
#######################
##these 4 are the new macros for UFXC that have to be loaded
def showbeam_UFXC '
        epics_put("8idi:softGlueC:AND-4_IN2_Signal","1UFXC");

def blockbeam_UFXC '
        epics_put("8idi:softGlueC:AND-4_IN2_Signal","1UFXC");

def shutteron_UFXC '
        epics_put("8idi:softGlueC:AND-4_IN2_Signal","UFXC");

def shutteroff_UFXC '
        epics_put("8idi:softGlueC:AND-4_IN2_Signal","1UFXC");


########################

def read_sample_temperature()'{epics_get("8idi:pid1.CVAL")}'

def select_UFXC '
        printf("Moving UFXC to position and setting UFXC logic circuit...\n");
    UFXC_data_mode

    umv ccdx -112.0;
    umv ccdz -118.0;
    wm ccdx ccdz
'

def UFXC_align_mode '
        epics_put("8idi:softGlueC:AND-4_IN2_Signal","1UFXC");
        shutteroff;
        printf("Shutter will remain OPEN for alignment if you open the shutter\n"
'

def UFXC_data_mode '
        epics_put("8idi:softGlueC:AND-4_IN2_Signal","UFXC");
        shutteroff;
        printf("Shutter will be controlled by UFXC if shutter is left in OPEN sta
'

def prepare_for_PICCD '
        #epics_put("8idi:softGlueC:AND-4_OUT_Signal","");
        #epics_put("8idi:softGlueC:OR-1_OUT_Signal","ShutterDrive");
        #printf("Any Detector other than UFXC can be used now\n");
'

def prepare_for_UFXC '
        #epics_put("8idi:softGlueC:AND-4_OUT_Signal","ShutterDrive");
        #epics_put("8idi:softGlueC:OR-1_OUT_Signal","ShutterDrive1");
        #printf("UFXC can be used now\n");
'

def wait_for_UFXC_Daq_done '
        sleep(5);
        printf("Waiting for UFXC to finish DAQ and ready for next Daq\r");
        while(epics_get("8idi:Unidig2Bi2.VAL","short") == 0 ) {


                sleep(0.5);
        }
        printf("UFXC is ready to start the next DAQ\n");
'


def UFXC_start_data '{
# How to trigger the UFXC detector externally triggered data acquisition
#    DAC_HIGH = 5.0
#    DAC_LOW = 0.0
#    epics_put("8idi:DAC1_1.VAL",DAC_HIGH)
#    do_sleep(1)
#    epics_put("8idi:DAC1_1.VAL",DAC_LOW)
# New FlexRIO logic
epics_put("8idi:Unidig2Bo7.VAL",1)
do_sleep(1)
epics_put("8idi:Unidig2Bo7.VAL",0)
}'
```

old value.

2 5/8" lightnow

Was 3" need to go

3/8" above where we normally sit

9.5 mm

UFXC. do edited.

(Lens out of way)

24s

800 KHz 2bit

5s data transfer.

First data 4/20/18 @ 20h44

* A01S_Aerogel_001

Ath0 5917 Hz

Camera took direct beam for some data.

4/20/18

Qingteng ran some Silica data

F002 - Silica_Burst_at1 Ø-857

It hung ??

S0516 Hz

Max. # frames => 50 kHz 200 000 frames

Max # of int in FPGA -

$10-10^6$

~~$\rho = 21.45$ g/cc~~
ρ_{Au} 19.3g/cc Gold.

5mg/ml 0.00026 (vol)

259 ppm

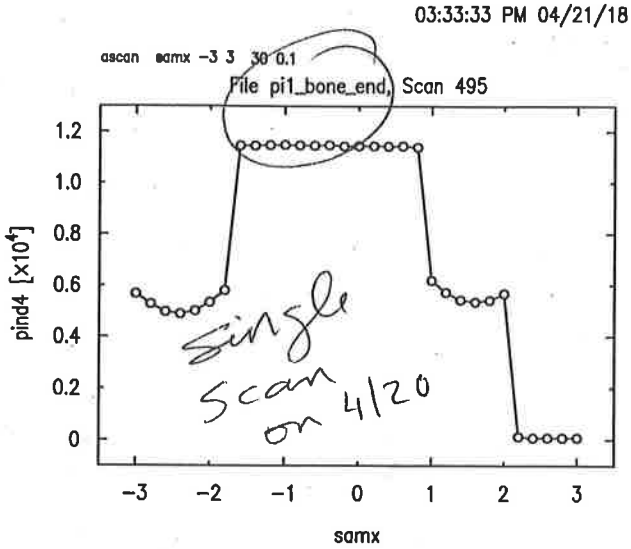
Alec's new sample above ↑

current unfocused condition @ 15h27 on 4/24/18

Slit #	hgap (um)	vgap (um)
2	20	20
3	81	80
4	210	241
5	120	220

crlx = 7.938
crlz = 3.14

03:33:33 PM 04/21/18



pind4: Peak at −1 is 11482. COM at −0.4398.
FWHM is 3.0159 at −0.31614.

Created new file 2018 Dufresne 0421

focused position in Dec 2017

si 1	250	250	← coherence slit
si 2	20	150	
si 3	200	200	crl x = 4
si 4	180	180	crl z = 3.5766
si 5	120	120	
	↑ Hgap	↑ Vgap	

distance from sample

	(cm)	Δz
Cons ~~Cons1~~	(227.3)	$34\frac{3}{4}$" = 88.3
si 2	139	16"
si 3	98.4	14" = 35.6 cm
si 4	62.8	32.8
si 5	30	

1.6

$64\frac{3}{4}$" + 32.8cm = 227.26cm (+30)

Aerotech loaded Silica 100 mm in his 1.5mm gap

pind2 = 854 cps dark.

Had

data = 109429 cps

```
/var/tmp/foo1          Sat Apr 21 16:10:48 2018

Detector  = 3
Amps_per_Volt(pind2)  = 2e-06 A/V
CtpV  = 100000
Length =   0.0400 cm
Element = Si
Ephot = 10915 eV
Si Elength =   0.018 cm

 108575 cps is a current of 0.218858 Amps

 5.02e+09 photons per second
```

unfocused.

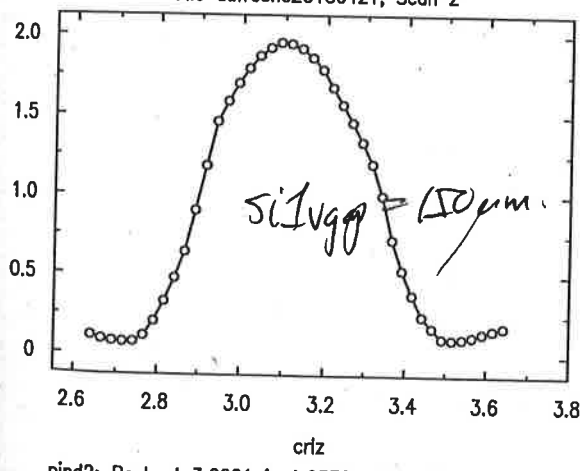
si1vgap = 150 Specfile dufresne20180421

#1 cr1x ⇒ mica flat. att 2

#2 cr1z -0.5 0.5 40 1

go to 3.1 mm.

04:17:24 PM 04/21/18



pind2: Peak at 3.0901 is 1.9536e+05. COM at 3.1225.
FWHM is 0.44538 at 3.1194.

```
/var/tmp/foo1          Sat Apr 21 16:19:00 2018

Detector  = 3
Amps_per_Volt(pind2)  = 2e-06 A/V
CtpV  = 100000
Length =   0.0400 cm
Element = Si
Ephot = 10915 eV
Si Elength =   0.018 cm

 194190 cps is a current of 0.390088 Amps

 8.98e+09 photons per second
```

att 2
× 3.60

3.23×10^{10} ph/s

si2vgap = 150 flux still good @ 194 hcps

si3vgap = 120 20 μm/foot beam change expe

#3 lup samx -3 3 80 1 go to samx = 0

#4 lup samx -2 2 80 1 w/ att 4 go to CEN

#5 lup samz -2 2 40 1 go to -0.5

#6 " " " " go to CEN

closed si 4 vap 100 210833 → 207000
closed si 5 vap 100 207000 → 206000

	vgap
Si 1	150
Si 2	150
Si 3	120
Si 4	100
Si 5	100

flux (dark 864)
pind 4

/var/tmp/foo1 Sat Apr 21 16:51:57 2018

Detector = 5
Amps_per_Volt(pind4) = 1e-06 A/V
CtpV = 100000
Length = 0.0400 cm
Element = Si
Ephot = 10915 eV
Si Elength = 0.018 cm

att 2
× 3.6

214030 cps is a current of 0.214794 Amps

4.95e+09 photons per second

1.78×10^{10} ph/s

File name No Sample.

66008_NoSample_50kHz

te: Sat, 21 Apr 2018 22:40:30 +0000
om: Eric Dufresne <dufresne@anl.gov>
: Alec Sandy <asandy@aps.anl.gov>, Suresh Narayanan <sureshn@anl.gov>
: Qingteng Zhang <qzhang234@aps.anl.gov>
bject: Re: new nanoparticles in fridge

lec, Sureshn,

am leaving shortly but I focused the beam, s1lvgap=150 um.
roughed the guard slit but things look fine with about 3x10^10 ph/s
n pind2, so one could have spent a bit more time there to optimize.

he camera runs at 50 kHz with the new power supply and cabling. Qingteng loaded
is cell with 100 nm Silica, and we localized some new Au nanoparticle solutions
rom Alec.

f something comes up tonight, I'll come over. Thanks for your help tomorrow.
lotr will have a short evening tonight.

ric

n Sat, 21 Apr 2018, Eric Dufresne wrote:

Alec,

we found the new Au nanoparticles in the fridge. When you have time (no rush),
can you send me and Qingteng your order information?
Thanks,

Eric

P.S. After the upgrade in power supplies, we are running at 50 kfps.

H001-H004 issues so aborted by ED @7h44

4/22/16

Pind 2 95.8 mA

calt 3 5.07×10^9 ph/s
=6.83

pind2 → 3.46×10^{10} ph/s

pind 4

calt 3 2.07×10^9 ph/s
=6.83

→ 1.41×10^{10} ph/s

Don't see a problem with

Aerogel -

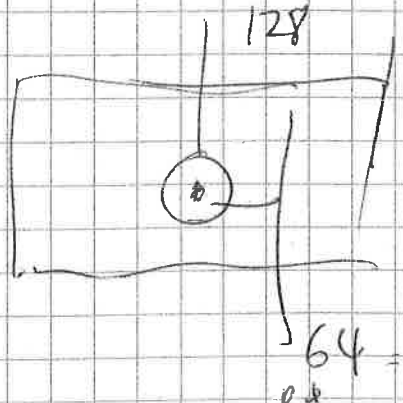
continuous mode

M → 10 repeats @ 50kHz w/ 200,000 frames

w/Det offset → ccdx = -97.725, ccdz = -111.875

Check flux @ APD

	ccdx	ccdz
$\phi_{1,0}$ =	10.63	-108.68



t =

atten = 2 64 pixels

ct = 158717 s^{-1} @ ccdx = 4.8 mm from ⌀

atten = 2 96 pixels

ct = 139609 @ ccdx = 7.2 mm from centre

⊙ → ⌀ = 3.45 mm

$$\frac{\pi \left(\frac{3.45}{2}\right)^2 = 9.34\,mm}{(0.075)^2} \rightarrow 1661.9\ \text{pixels}$$

$(75\mu m)^2$

$\frac{158717}{1661.9\ \text{pixels}}$ 95.5 ~~75~~ cts/pixel/second

↳ 343.8 ph/pixel/sec @ Q ≈ 0.0075 Å^{-1}

wattenwyl ti4-x-3 55μm

for lambda $\approx \left(\frac{55}{75}\right)^2$ → 185 ph/pix/s

95.5 cts/pix

Cont 50 kHz ⇒ 1.9×10^{-3} ph/pixel/frame @ 50 kHz

Burst 400 kHz → 2.39×10^{-4} ph/pixel/frame @ 400 kHz

(ti4xd 2/27 =

But this is @ att = 2 = 3.6 so multiply by 3.6

From APD

50 kHz ⇒ 6.8×10^{-3} ph/pixel/frame @ 50 kHz

400 kHz → 8.5×10^{-4} ph/pixel/frame @ 400 kHz

cf. MFX measurements are ≈ 23x less

atten = 2 64 pixels

ct = 158717 s^{-1} @ ccdx = 4.8 mm from ∅

atten = 2 96 pixels

ct = 139609 @ ccdx = 7.2 mm from center

① → ∅ = 3.45 mm

$$\frac{\pi\left(\frac{3.45}{2}\right)^2}{(0.078)^2} = 9.34\text{ mm} \rightarrow 1661.9$$

158717 / 1661.9 pixels

95.5 (75 μm)^2 cts/pixel/second

↳ 343.8 ph/pixel/sec unatten

@ Q ≈ 0.0075 for lambda ≈ $\left(\frac{55}{75}\right)^2$ → 185 ph/pixel

95.5 cts Hp2

Cat 50 kHz ⇒ 1.9×10^{-3} ph/pixel/frame @ 50

Burst 400 kHz ↔ 2.39×10^{-4} ph/pixel/frame @ 4

(ti4xd 2129 =

But this is @ att = 2 = 3.6 so multiply by 3.6

from APD

50 kHz ⇒ 6.8×10^{-3} ph/pixel/frame @ 50kHz

400 kHz → 8.5×10^{-4} ph/pixel/frame @ 400kHz

cf UFXC measurements are ≈ 23x less than APD measurements

Date: Mon, 23 Apr 2018 18:08:21 +0000
From: Eric Dufresne <dufresne@anl.gov>
To: Suresh Narayanan <sureshn@anl.gov>
Subject: Re: Argonne computer to be added to the 164.54.116.xx subnet (fwd)

---------- Forwarded message ----------
Date: Mon, 23 Apr 2018 18:03:31 +0000
From: "Westbrook, Mary L." <westbroo@anl.gov>
To: "Sciutto, Giampiero" <gs1@anl.gov>, "Dufresne, Eric" <dufresne@aps.anl.gov>
Subject: Re: Argonne computer to be added to the 164.54.116.xx subnet

K, ufxc32k has been added to our database and assigned IP address 164.54.116.12.
Please restart this system and confirm that it obtains the iP address ~~above~~.
Then, try to mount the file system again. Please let me know what happens.
thanks mary

From: Sciutto, Giampiero
Sent: Monday, April 23, 2018 11:08 AM
To: Westbrook, Mary L.
Subject: Re: Argonne computer to be added to the 164.54.116.xx subnet

oh, sorry

and the MAC address for this device is: HWaddr 00:80:2F:16:F2:9B

but that might be already in the ticket?

TASK0057803 / RITM0081209 (add new NI XI ...)

could you add the device in IHW and ETS lite

thanks a lot - JP S.

[illegible]

33

CCD X = 97.725 mm
mount CCD X to work + replace
sensor + PCB #11 now
We had #9 in beam!!

To get
+ Serial control of
PS-350
Now power
+ Supply — need
4 channels
+ Good peak current.
+ Mount PS
+ + Box?
+ + Mount NFS

Subject: Re: mounting s8iddata
From: David Wallis <wallis@anl.gov>
Date: 4/23/2018 5:06 PM
To: "Sciutto, Giampiero" <gs1@anl.gov>
CC: "Narayanan, Suresh" <sureshn@anl.gov>, "Dufresne, Eric" <dufresne@aps.anl.gov>

Since that is the only computer that seems to have trouble mounting file systems from s8iddata, it seems likely that running a 32-bit operating system is at the core of it. It's not an export issue (all 164.54.116 IPs have full mount permission), and the message would be "permission denied" rather than what you're seeing.

Check to see if there is a "mount.nfs" executable, most likely in /sbin. If not, someone will need to install whatever package provides it for that Linux ~~distro.~~ In RedHat/CentOS, it's in the nfs-common RPM.

On 04/23/2018 04:59 PM, Sciutto, Giampiero wrote:

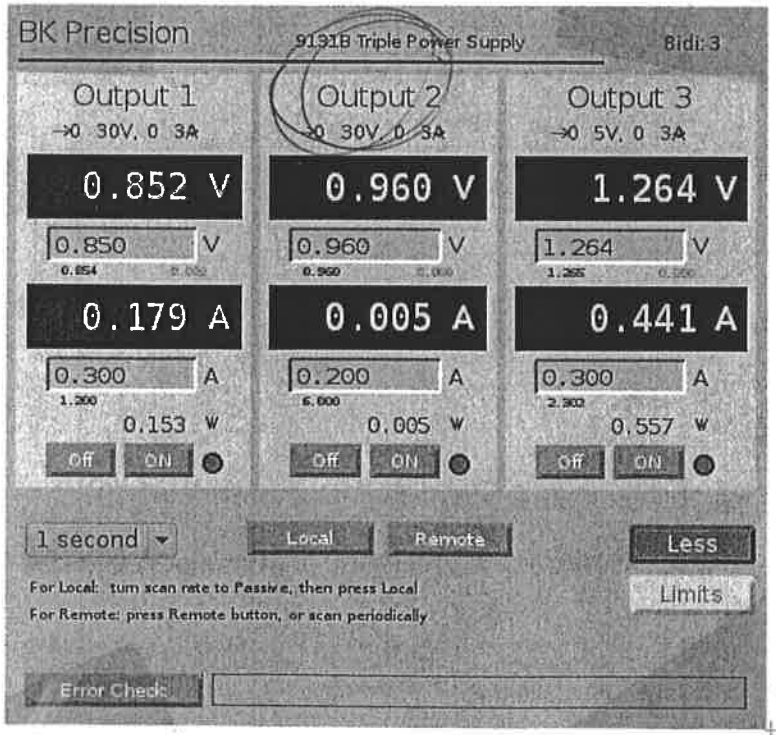
> Hi Dave
>
> the device: NI-7935R
> has a legit IP address: 164.54.116.12 however It cannot mount:
>
> admin@NI-7935R-01C615DC:~# mount -t nfs s8iddata:/export/8-id/ /mnt/8-id-i
> **mount: wrong fs type, bad option, bad superblock on** s8iddata:/export/8-id/,
> missing codepage or helper program, or other error
> (for several filesystems (e.g. nfs, cifs) you might
> need a /sbin/mount.<type> helper program)
>
> In some cases useful info is found in syslog - try
> dmesg | tail or so.
> ==========
> the error message seems to indicate that the server 8iddata doesn't allow this device to mount the filesystem could you add the device to the /etc/exports

4/23/2018 11:06 PM

Continuous → Burst

0. Set mode to Burst
1. No. of Frames not bigger than 30k (start with 300)
2. Clock (Hz) → 100 M = 400 k fps
   310 M = 1.2 M fps
3. ACK vs. Increment Bitslip
4. If you see bad image pattern in 20 s → bad lines then
   4a. Stop
   4b. Start

For 100 M Clk power supply of Output 2 = 0.96 V
310 M =



Output 2 - Digital 1.2 V
0.96 V → Continuous
1.5 V → Burst-

Burst to continuous

Idle → Set Operation 'Continuous' - Change button

Look for 'Continuous 26 bit Mode' for Operation Mode

Clock — 310M = 1.2MHz burst, 100M = 400 kHz burst

(. Continuous 220M - 'Change'

No Of Frames 300 just to see image

→ Voltage 2 — 0.960 V for continuous (was 1.5V for burst @ 1.2MHz - otherwise 0.96V ok for ~400kHz burst

then NI 'ACQ' but will fail

'Increment Bit Slip' → ACQ — toggle until get correct image

'Elements' - NI

Max storage = 350 Meg ≃ 60-80 Million event

20 x frames = 280,000 photons

Need to keep 'Elements' ≥ 60-80 Million

Right now 1400 photons

For 200,000 frames ~~should~~ should keep size/ ≥ 300 ~~frames~~/ photons/frame

So at 3 for this particular sample

Make sure 'Sync Enable' checked

Around 11h45 on (4/24/18)

+ Set up N_2 flow in 8ID-E

+ Moved samy upstream 10mm

Started cooling down

* Good data set 50 hfps w/ 66 258K

Cooled to 10C or 283K.

#21 samx scan more to CEN

#22 samz scan more to CEN

HH @ 283K (10°C)

(46.6 M hits)

II @ 5°C

Now going to dd @ 0°C

Alec reduced the bath set point to 8.3°C

Reached (-2.3°C)

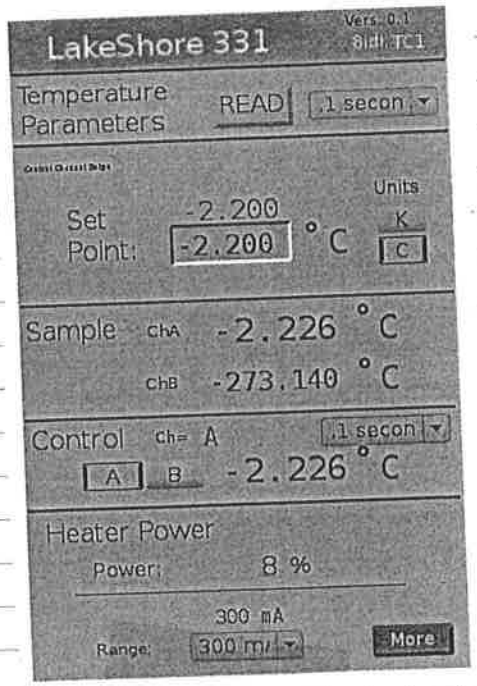
Set up double Peltier

Alec + Suresh did it.

using EPICS PID

#22+23 samx, samz w/ double Peltier stage

#24 samz



So Sample froze, scattering behind beam stop?
→ aggregation

We warmed up sample // Reloading

Lambda_Aero

Summary

New FlexR10 mini crate worked great. Was able to save data with sparsific resulting in 50 000 kfps sampling ~~at~~ for 4 s or 200 000 frames.

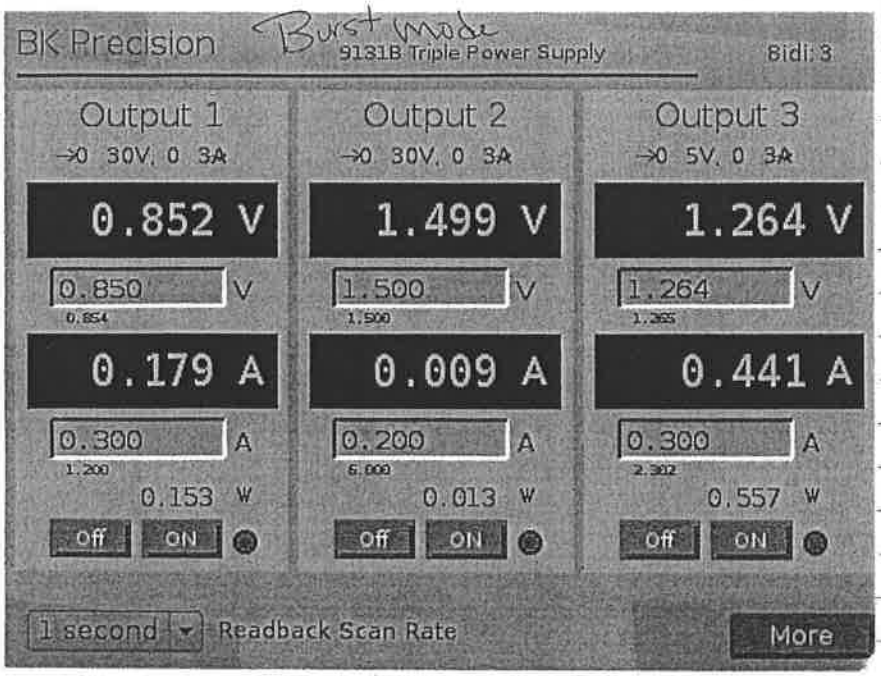
+ Burst mode was pushed to 1.2 Mfps and we could record 30 000 repeats
+ Burst mode has two frequencies 1.2 and 0.4 Mfps //

+ Reloaded new sample after Sample froze
+ Had lost X4 from freezing

Final settings HV = set point 180 V
measured 179 V

Tenma Digital (2.5) 2.4 V / 0.6 A

See other PS voltages next page.



192344A-01

Cable lm

5/18/18 13h47

Asked by John W. to open up si6 for FCCID2

si6T = -5000 } before changes
si6B = 5000 }