SSRL Experiment Problem Scenarios

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Your input regarding this list is valued.
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Ion Chambers

Problem:
Keithley I-V amplifiers output signal is negative.

Solution:

Check that the Fluke H.V. supply is on. Typically -300V (-800V on BLs with LN monos) on the 6" long IC and -800V on the 2.5" ICs. Be sure the H.V. is high enough to plateau the signal (one more -100V click should add little or nothing to the signal).

Problem:
H.V. supply is on but there is no sign of H.V. on the IC.

Solution:
If the Fluke's power is cycled it must be switched to *standby* mode and then to *on*. Otherwise it will seem to come on but not put out the high voltage. The indicator lights of the Fluke often burn out, but the Fluke still puts out voltage.

Problem:
Fluke H.V. supply output voltage is not correct at some settings.

Solution:
Rapidly switching the Fluke's voltage selector will discharge too large a capacitor through the switched resistor and burn it out.

Problem:
Bumps in my data.

Solution:
The IC gas returning to the distribution manifolds can be dipped into the mineral oil bubbler to confirm return flow. The bubbling will send pressure pulses back into the IC and change the ionization rate.

Switching the hutch lights can make noise that gets amplified by the Keithleys.

H.V. is too high. This may cause arcing between the IC plates, especially if the IC gas is helium.

Problem:
Divide-by-zero error from the computer.

Solution:
If the offset of the IC Keithley is negative (-0.002 e.g.) when there are no x-rays in the chamber, plotting a ratio will cause a *divide-by-zero* error because a negative number is read as zero.

Problem:
Small signals from the IC Keithley amplifiers aren't as large as expected.

Solutions:
IR loss on the RG-58 coaxial cables begins to dominate the signal when the Keithley output voltage drops below 100mv. Turn up the gain on the Keithleys.

Attenuation filters may be in.

Problem:
Large signals from the IC Keithley amplifiers aren't as great as I expected.

Solution:
Keithleys over-range at 10.0 volts and become non-linear. Running above 10 volts can also change their calibration. The SRS amplifiers over-range at 5.0 volts.

Problem:
IC normalized signals have changed slowly from scan to scan.

Solution:
Check IC gas supply. Replacement bottles are on the west side of the ring.

Other Detectors

Problem:
Photomultiplier tube (PMT) or Ge detector gives little or no signal.

Solutions:
One may have changed energy without adjusting the discriminator windows on the single channel analyzer(SCA).

Direct beam in these detectors will burn them out. For the Ortec Ge detector, 10,000 counts/second is a good upper limit for linearity. The Canberra single-element Ge detector will do ~40,000 cps depending on shaping time.

H.V. is not on, or the Ge detector is not cold, or there's no preamp power.

Problem:
Lytle detector is passing glitches and noise into the data.
Solution:

When normalizing with I_0, the I_0 I-V amplifier's rise time should be set to match that of the Lytle detector, typically 100msec.

Problem:
Diffractometer scans are not repeatable.

Solution:
Diffractometers are sensitive to balance, eg an anti-backlash spring can compress in its gear reducer. Take the time to carefully balance throughout your operating range. The X-Ray Group can help with this.

Monochromator Crystal Tuning:

Problem:
Piezo-driven crystal tune is not working.

Solution:
Check for red "tripped" light and see that the control source selector switch is set to internal. It can also be controlled by computer via a DAC.

Problem:
There is beam in the hutch, but edge scans are poor. Scans looks like trash!

Solutions:
The motor mike inadvertently ended up on the wrong reflection. This is especially easy to do with the Si(220) and (400) crystals. They have many reflections quite close in space and crystal angle to the fundamental.

In some beam lines, the trash-light in the beam pipe is much brighter than the fundamental monochromatic light (b/l 2-3 is a good example of this), so moving the monochromator entrance slits toward the aperture between the crystals can let this trash light through the monochromator and into your hutch where it is so bright that it can easily be mistaken for the fundamental.

Motors

Problem:
Lost calibration on table/mono/diff.

Solution:
Manually running the stepping motor controller (SMC) will cause ICS to lose the correct software position value.

Problem:
Stepping motor is stuttering and has little torque or won't run at all.

Solution:
Unplugging or plugging in a stepper motor with the driver turned on will frequently destroy one or more of the phase drives. It will need to be rebuilt. Do not pass go, pay $200.

Computer

Problem:

Solution:
http://www-ssrl.slac.stanford.edu/computing/blcomp

http://www-ssrl.slac.stanford.edu/computer_info.html

Operations

Problem:
I paged the Duty Operator (DO) using the building voice-page by dialing *161* but no answer yet.

Solution:
The DO may be out of the buildings or out of earshot
Try the DO personal pager *9-846-0440*.

Problem:
Need an extension to run a few more scans. Who do I talk to for official permission?

Nine hours (0700-1600) are set aside for most beamline checkouts. The oncoming user gets what time is not used by the X-Ray Group checkout. So you got yours at the beginning of your run. You should be out of your hutch and off the beamline at 0700 for the beginning of the X-Ray checkout. The next user is entitled to what time is left between the end of your run and the beginning of the next. Negotiating an extension with the oncoming user is not adequate. The lab equipment used in your experiment may be scheduled to be used on another.

1) Call Cathy Knotts (x3191) and ask for an extension.

2) Tell the DO that you need an extension of your *Safety Check List* and give as much lead time as possible. At this point, the extension is by no means a "done deal".