Inelastic X-Ray Scattering
Six-Element Linear Array
GSECARS (Sector 13)

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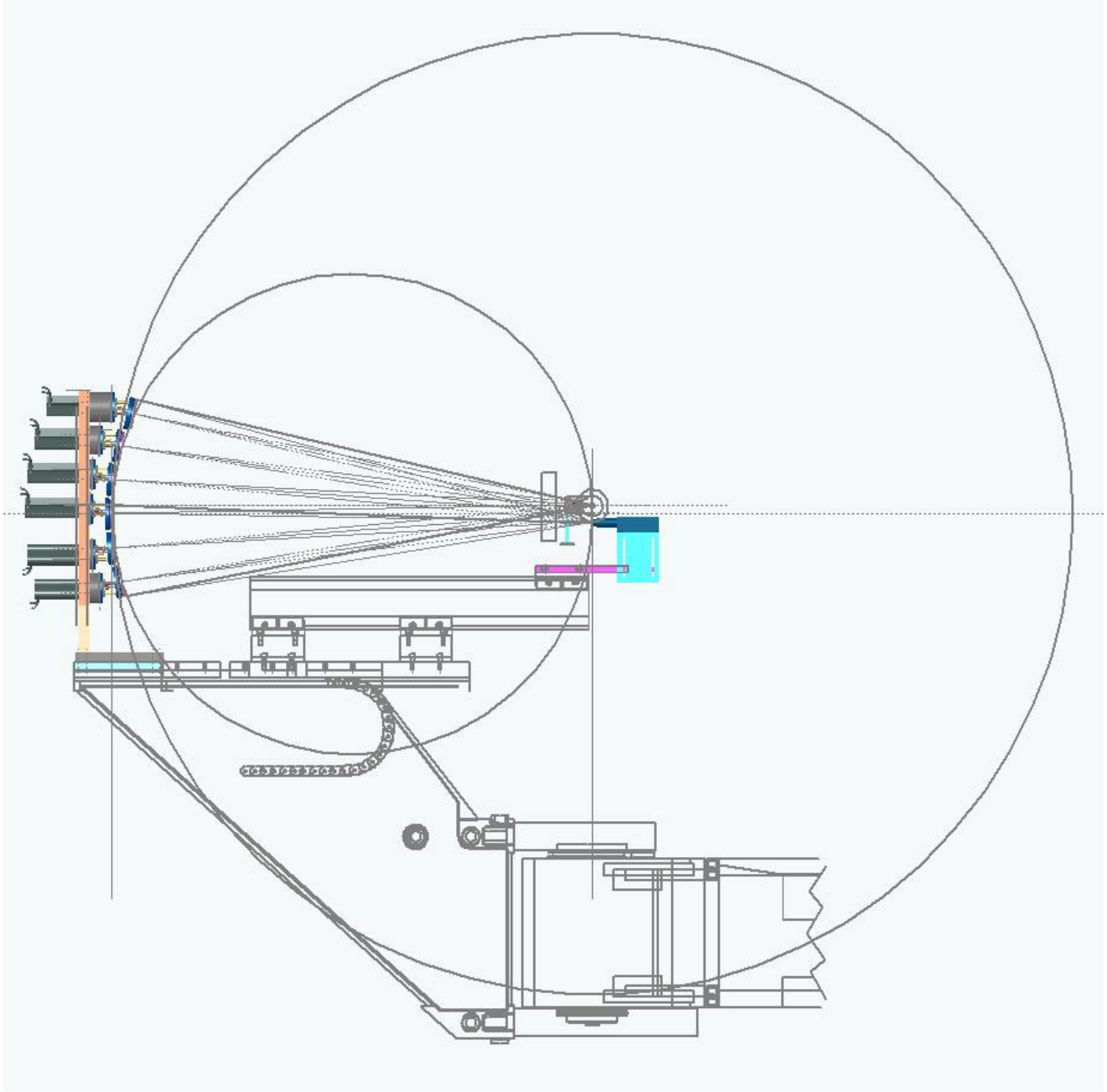
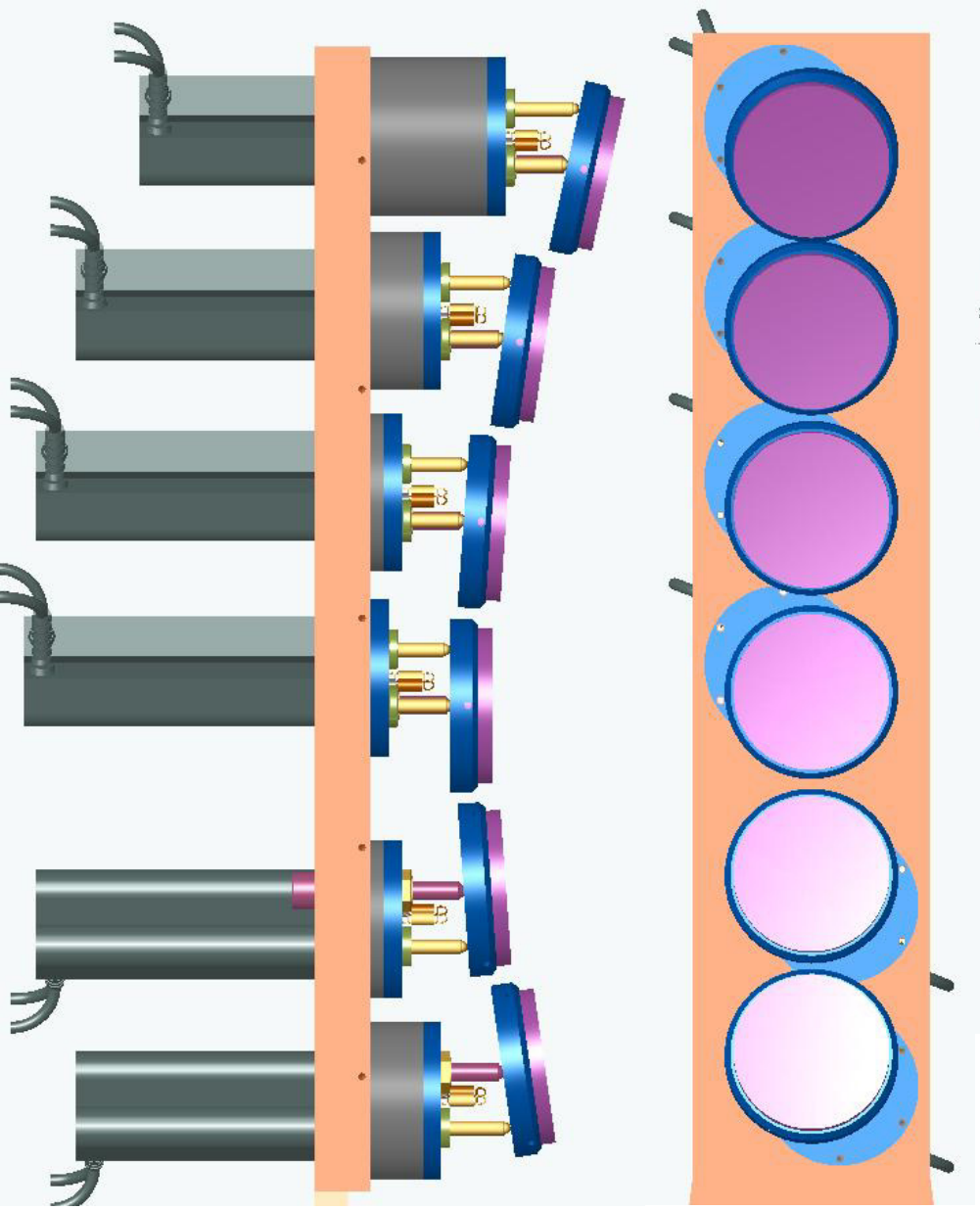
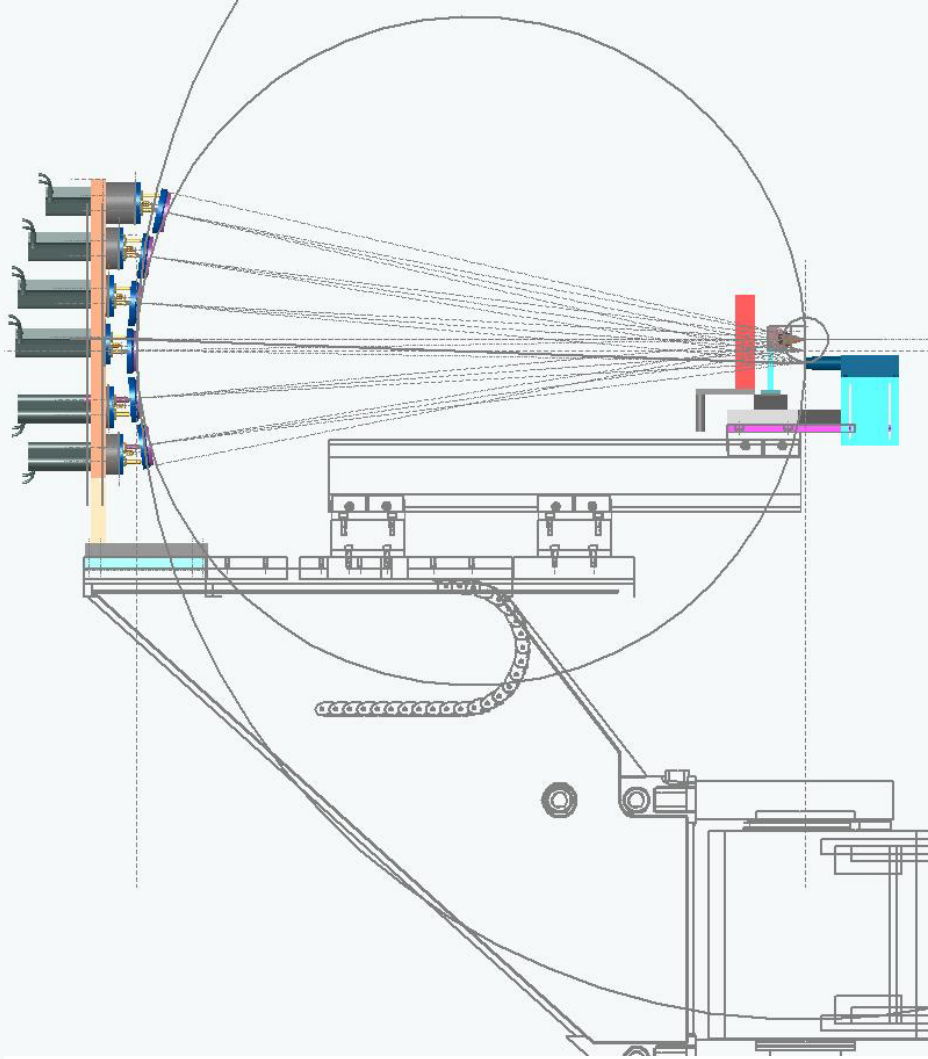
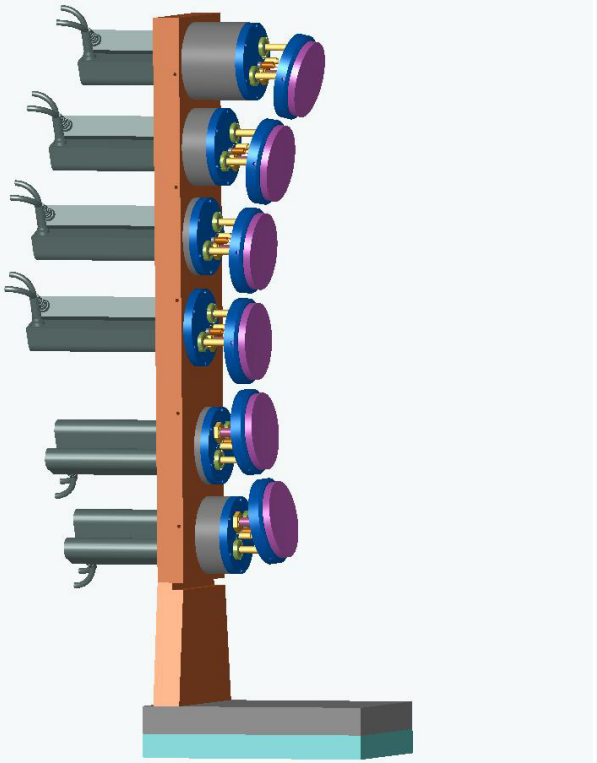
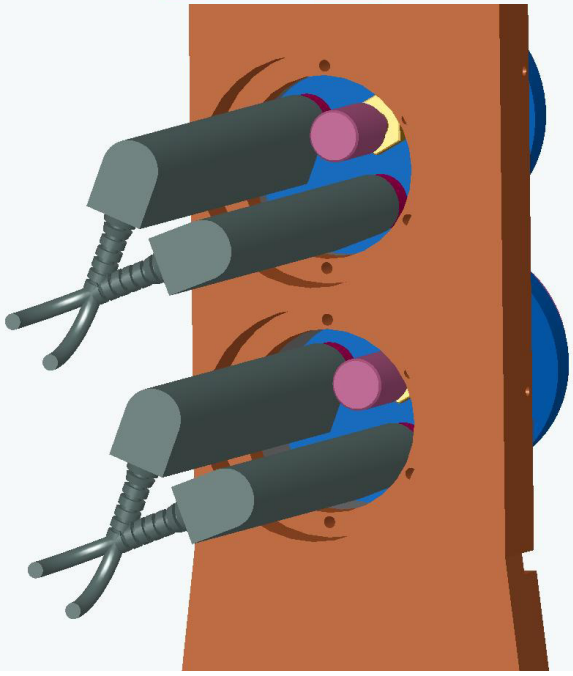
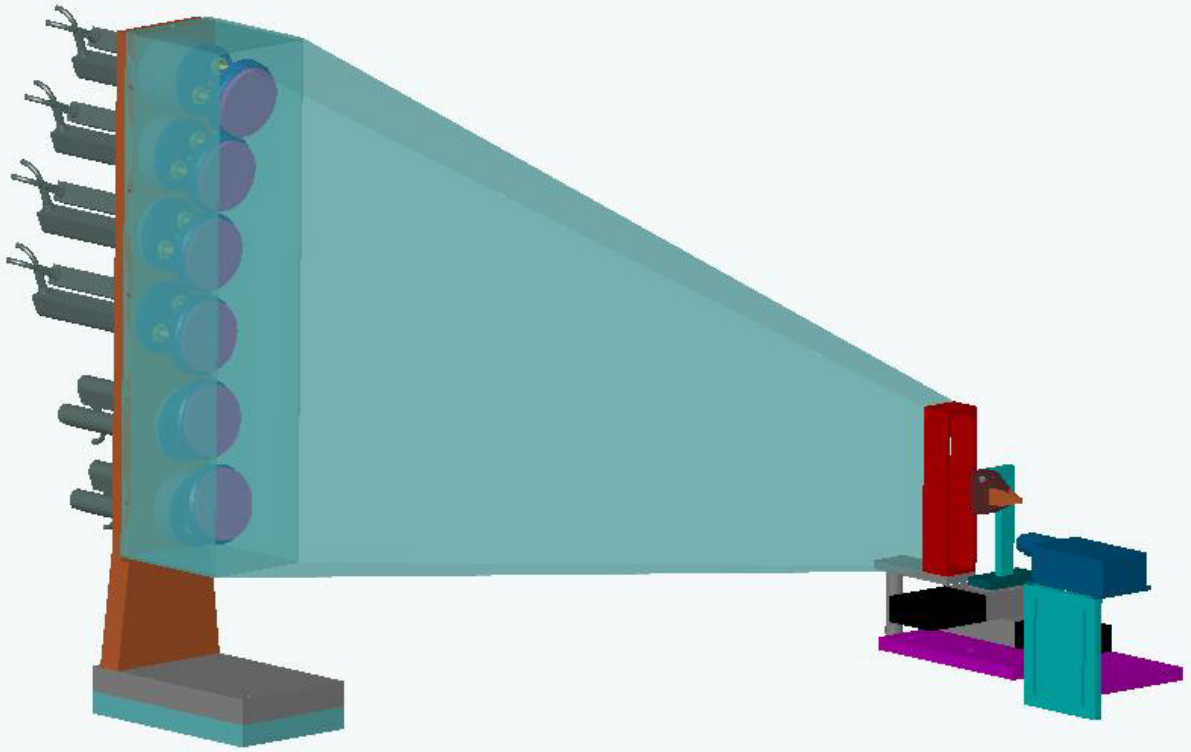


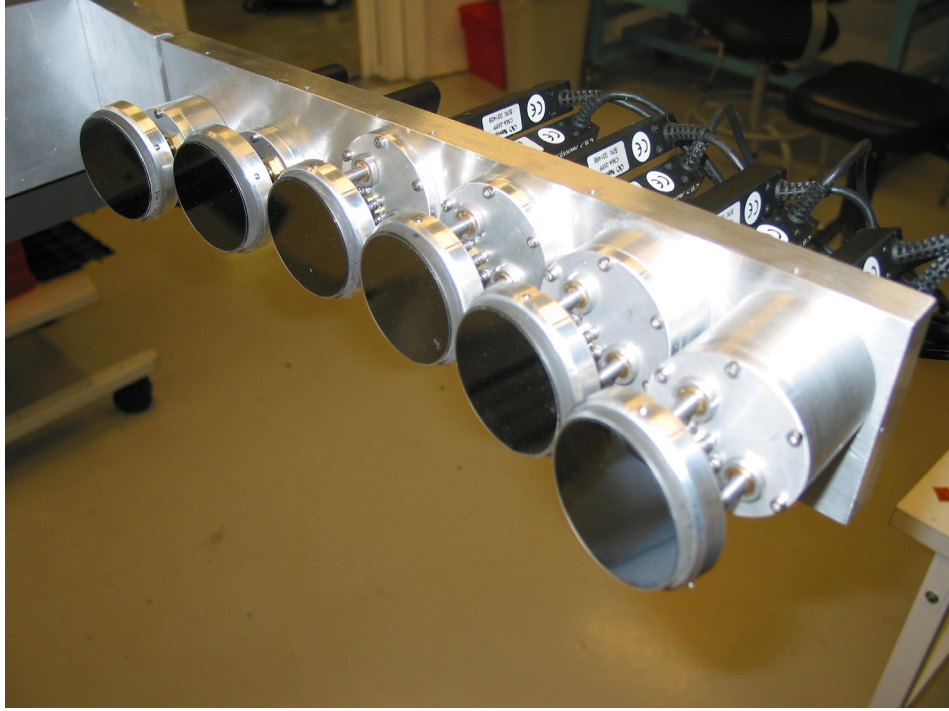


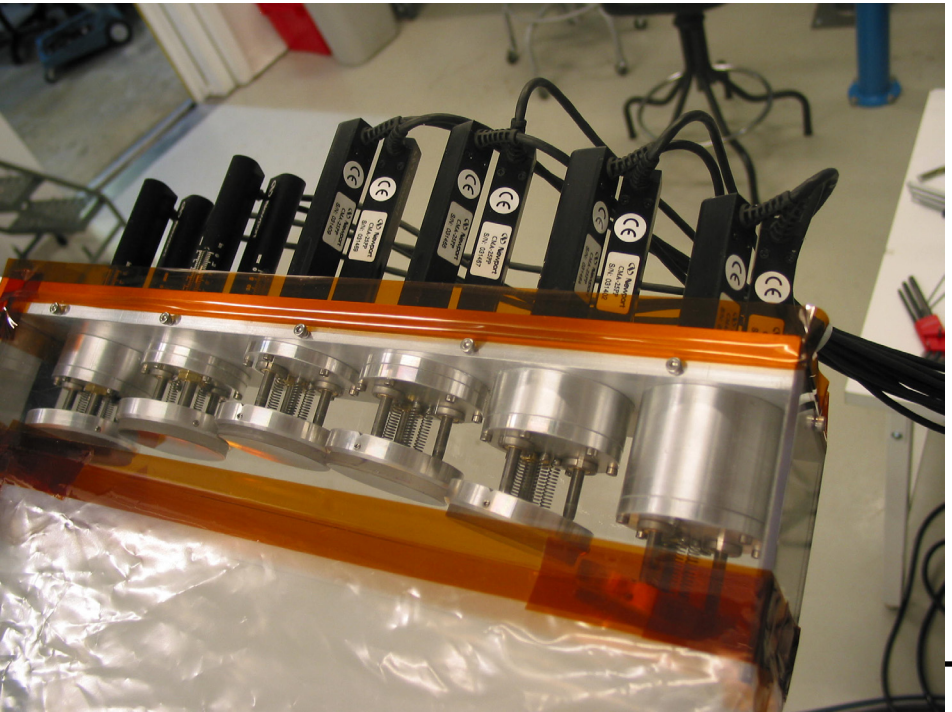


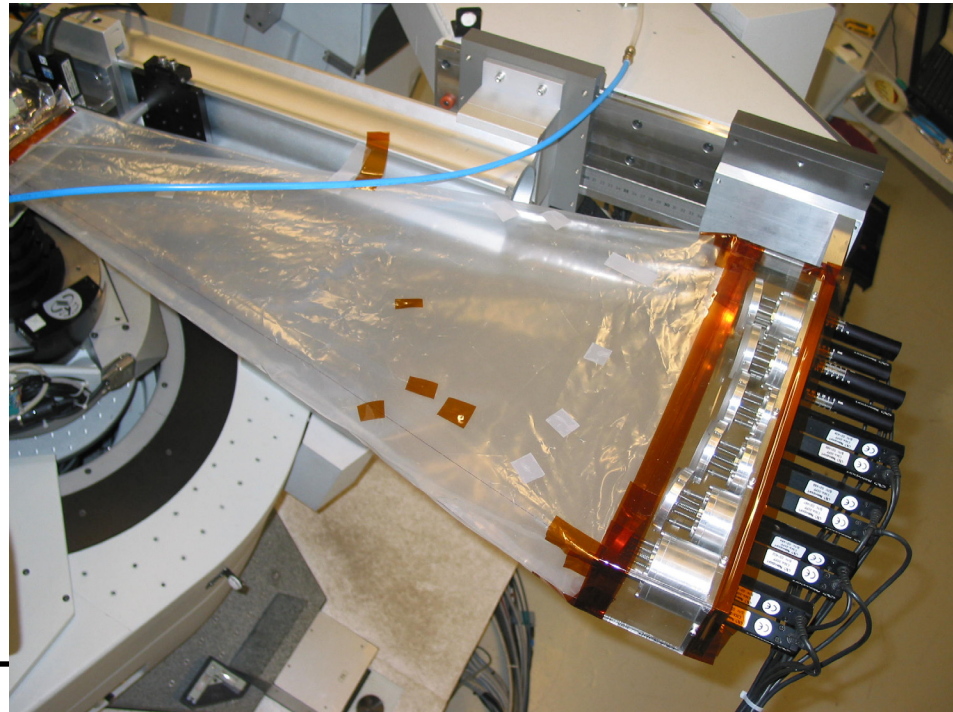


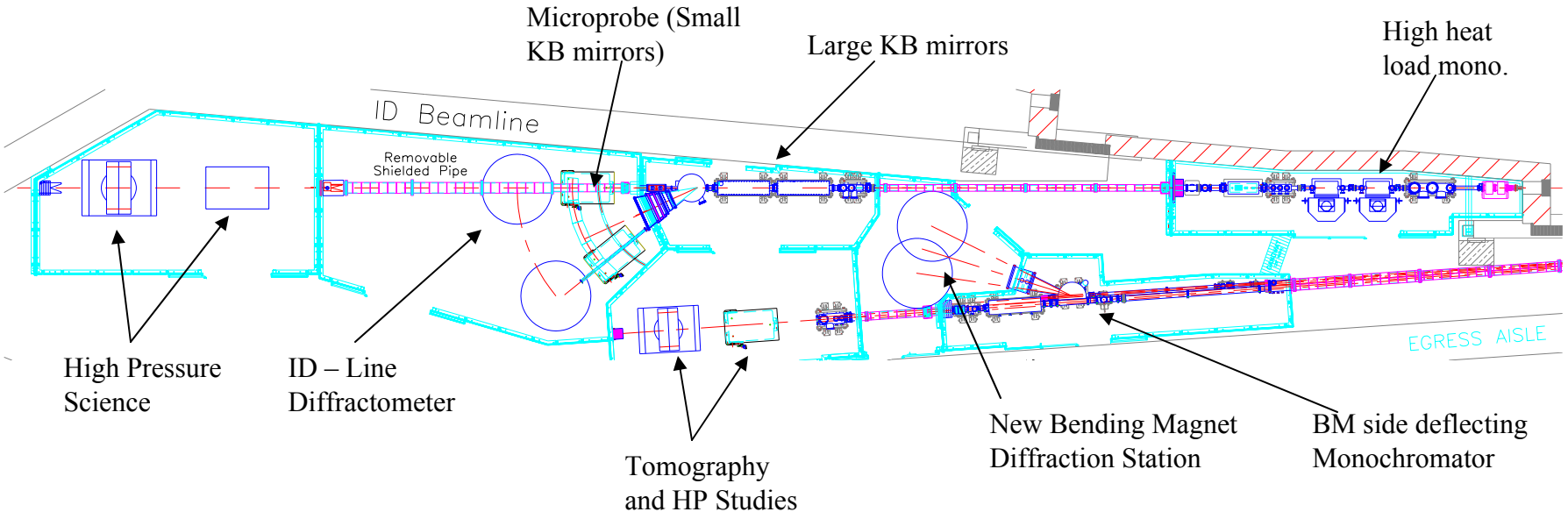








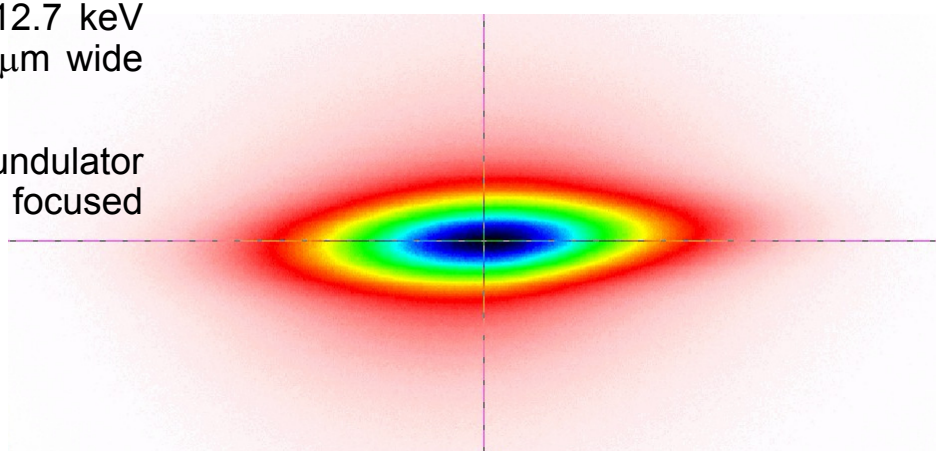


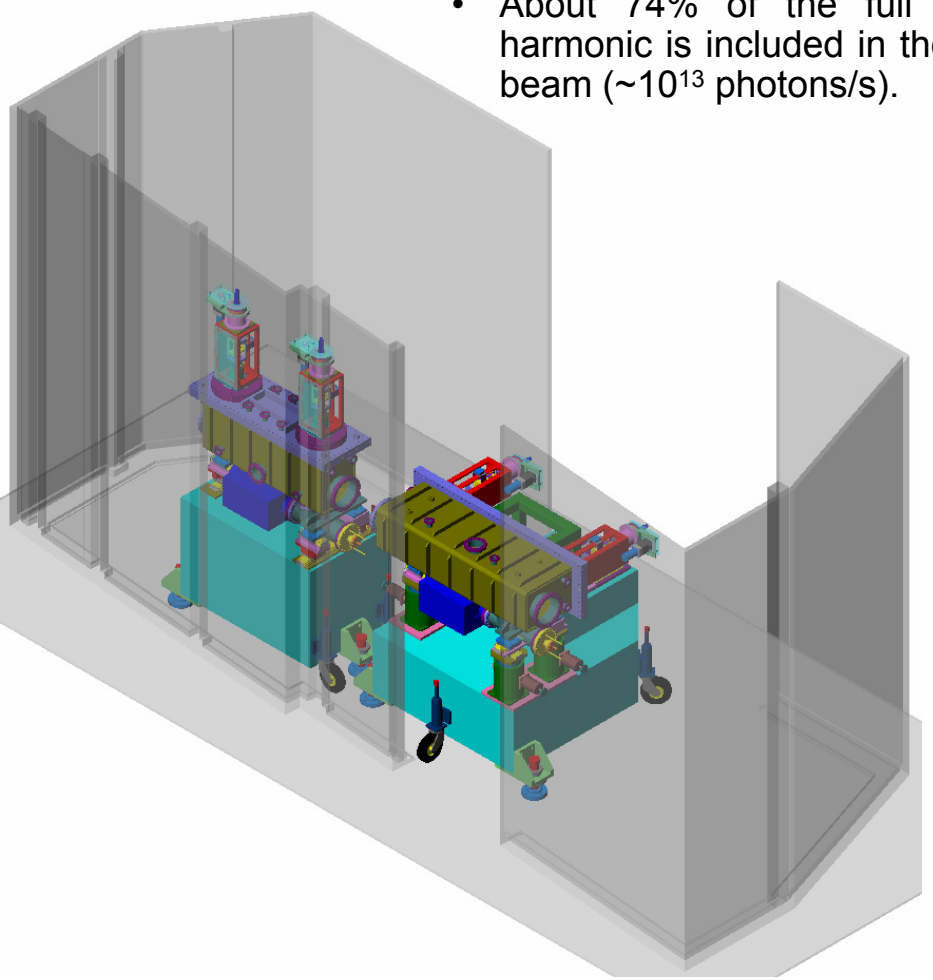


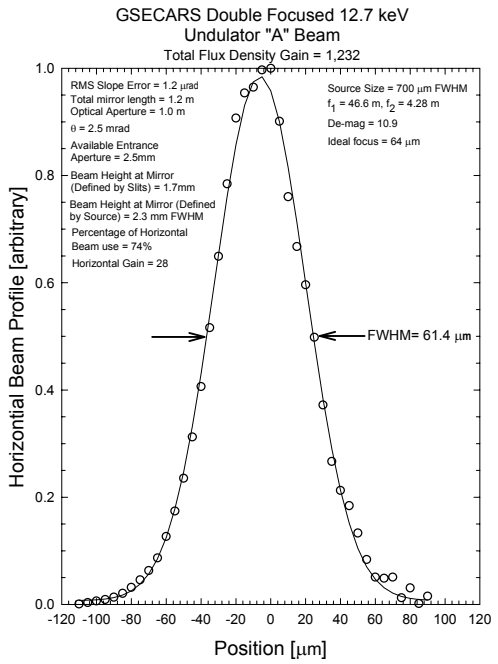
- Two diffraction Stations
  - 13-ID-C in operation and the location for these measurements.
  - 13-MB-C planned to start operation in 1st Quarter 2004

- X-ray Optics
  - ID line
    - Cryo Cooled Si 111
    - Large KB mirrors Demag ~ 10:1
    - Small KB mirrors Degmag ~500:1
  - BM line
    - Side Deflecting monochromator
    - Vertical focusing mirror

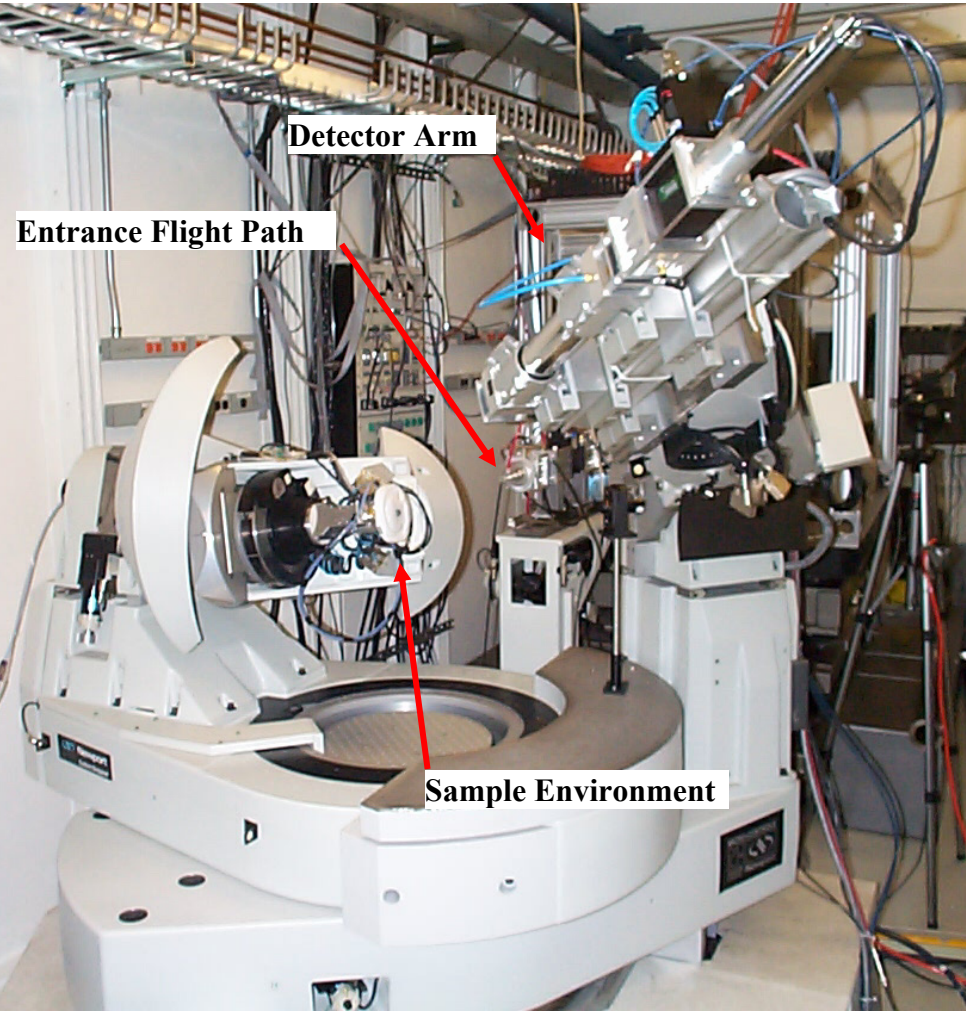
- Image of double focused 12.7 keV Undulator “A” beam: 61.4 μm wide by 13.4 μm tall.
- About 74% of the full undulator harmonic is included in the focused beam (~10^{13} photons/s).

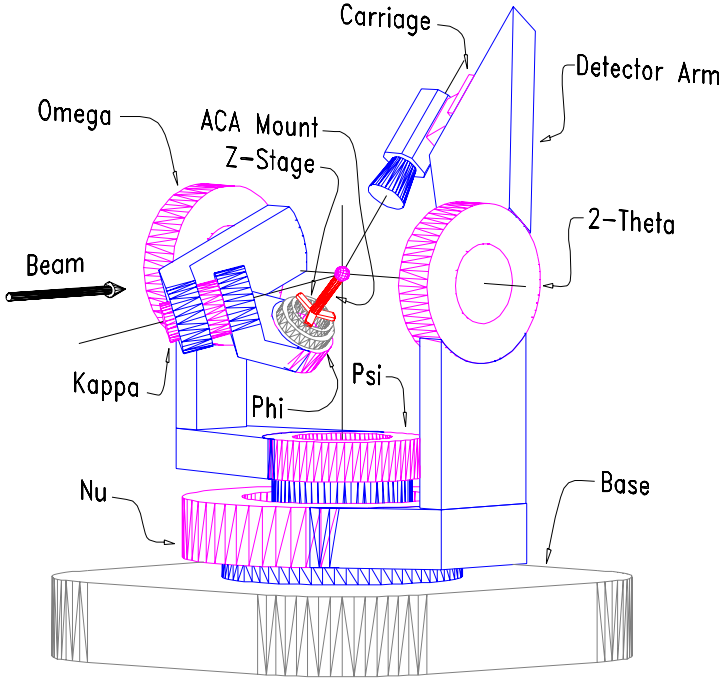






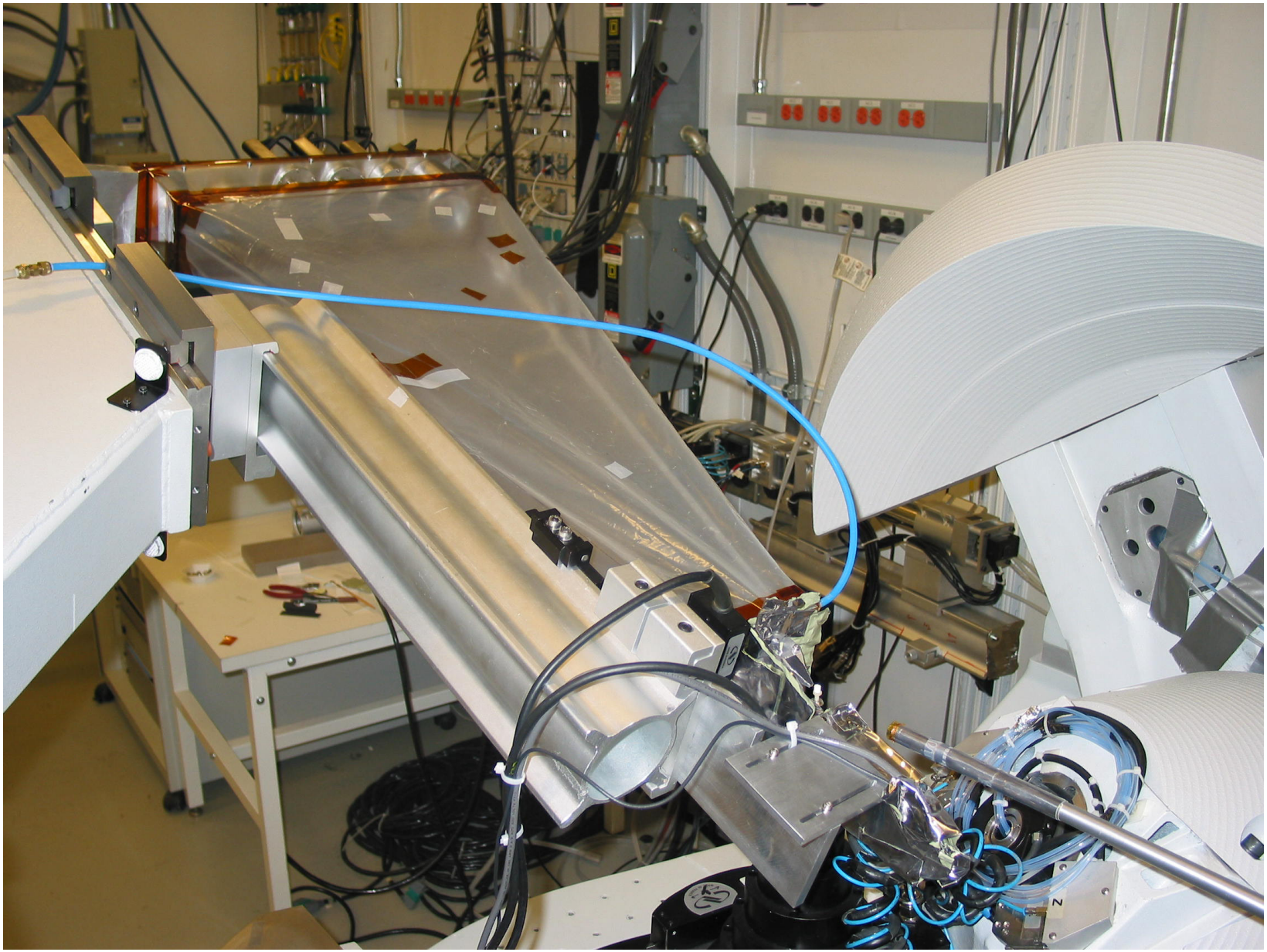
General Purpose Diffractometer 2+2+Kappa (CARS – Newport Collaboration)

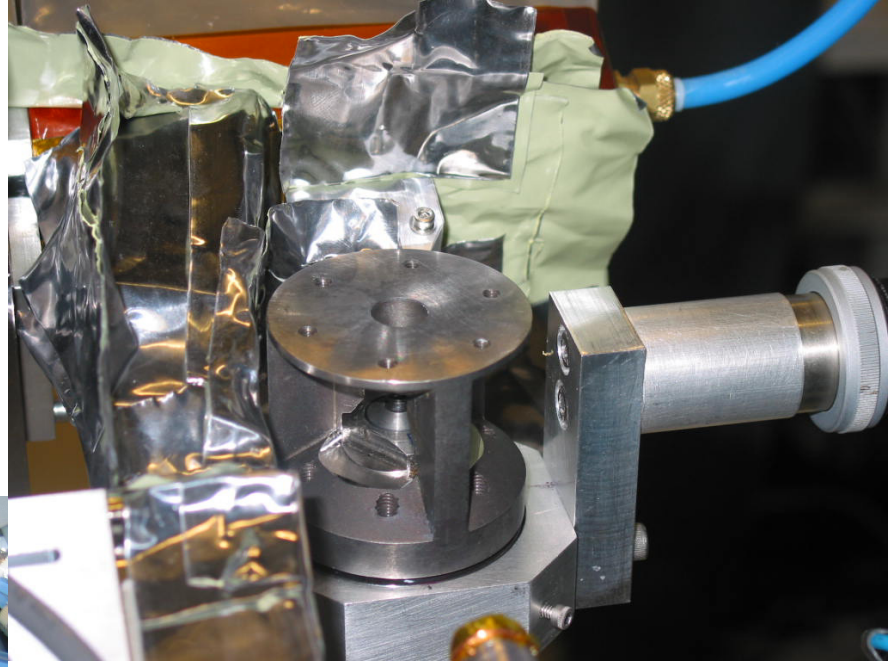


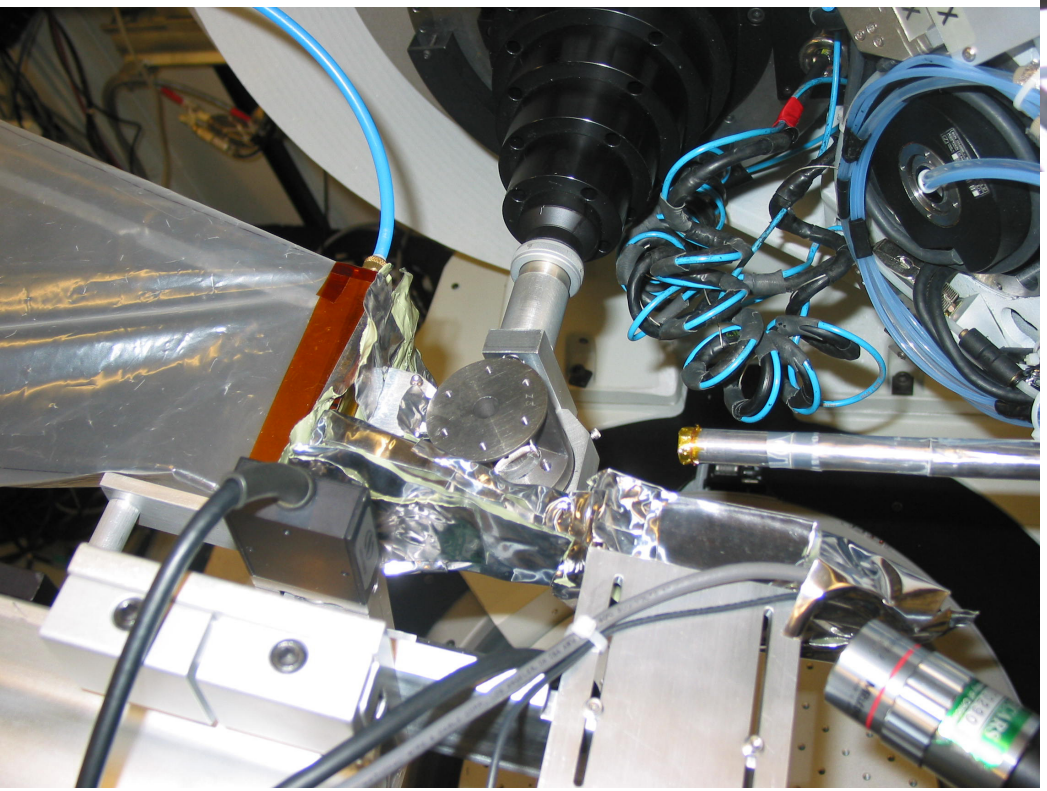


Open sample cradle, capable of supporting large sample environments weighting up to 10kg.

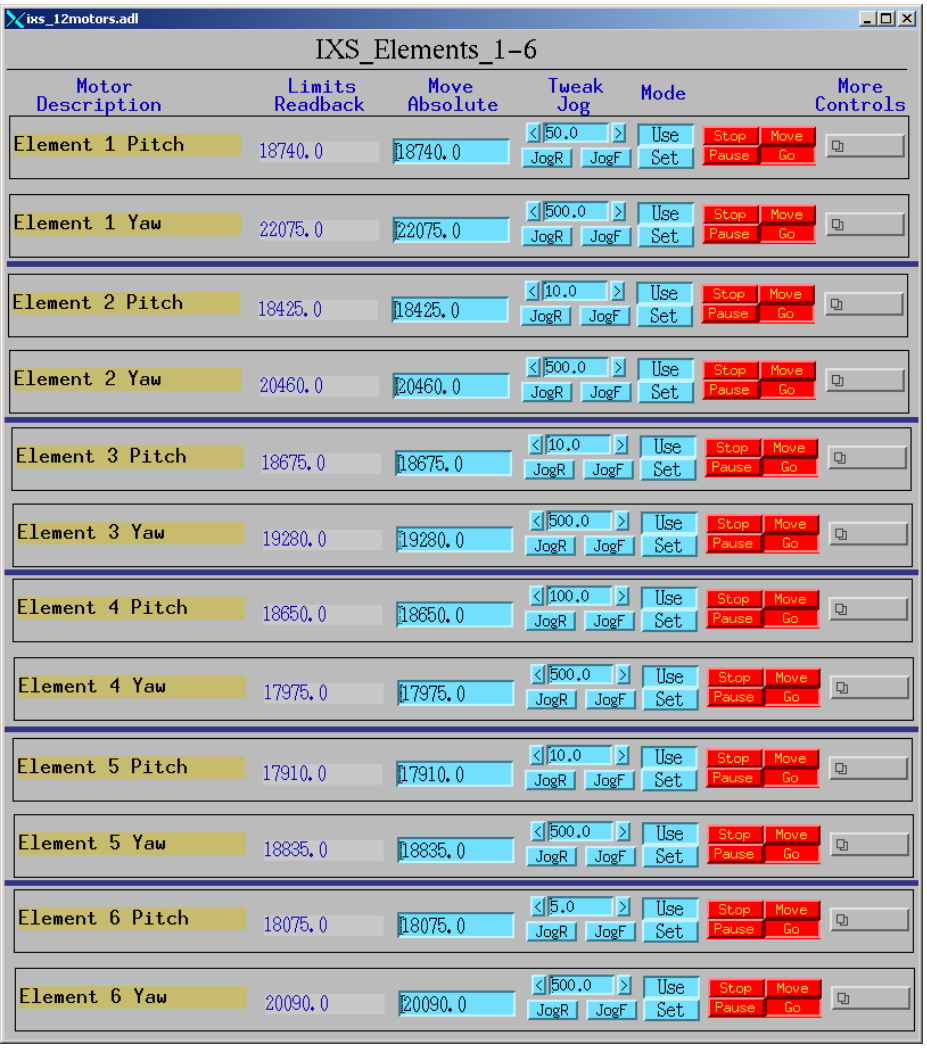
- High temperature furnace.
- Liquid solid environment cells.
- Closed loop refrigerator.
- Diamond Anvil Cell (DAC)
- High power liquid He and LN2 cryostat
- Small UHV Chamber with Hemispherical Be window



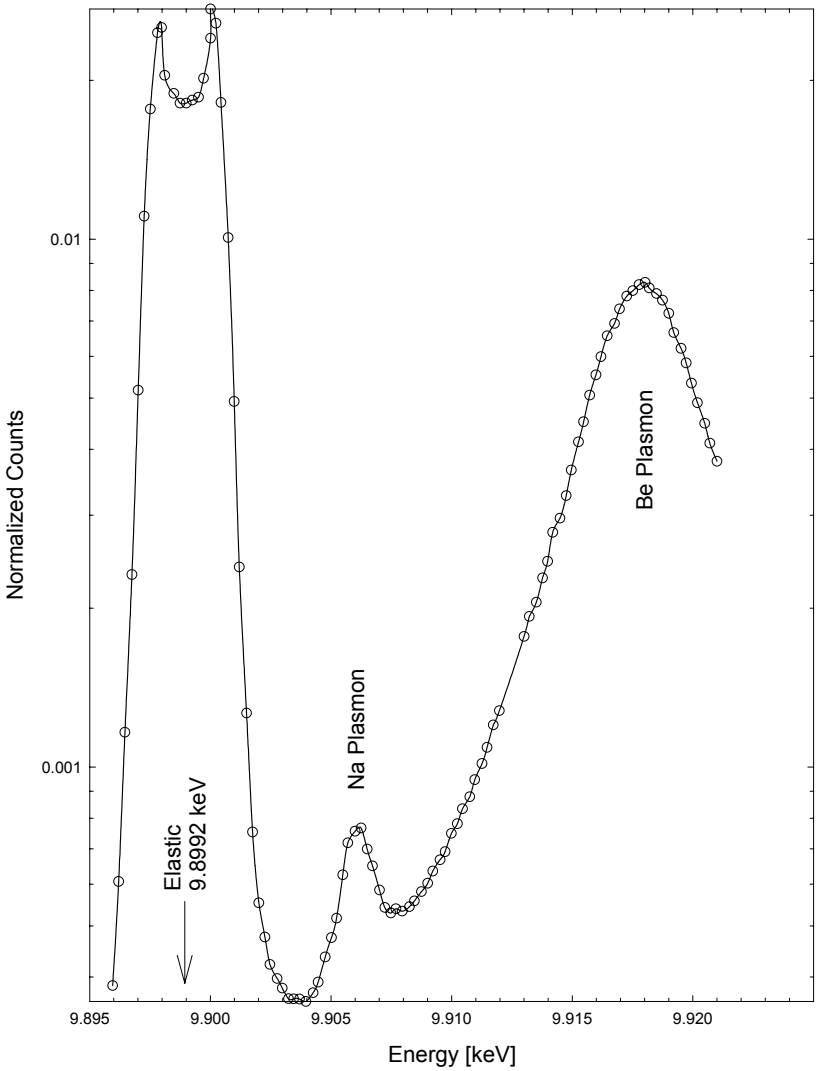


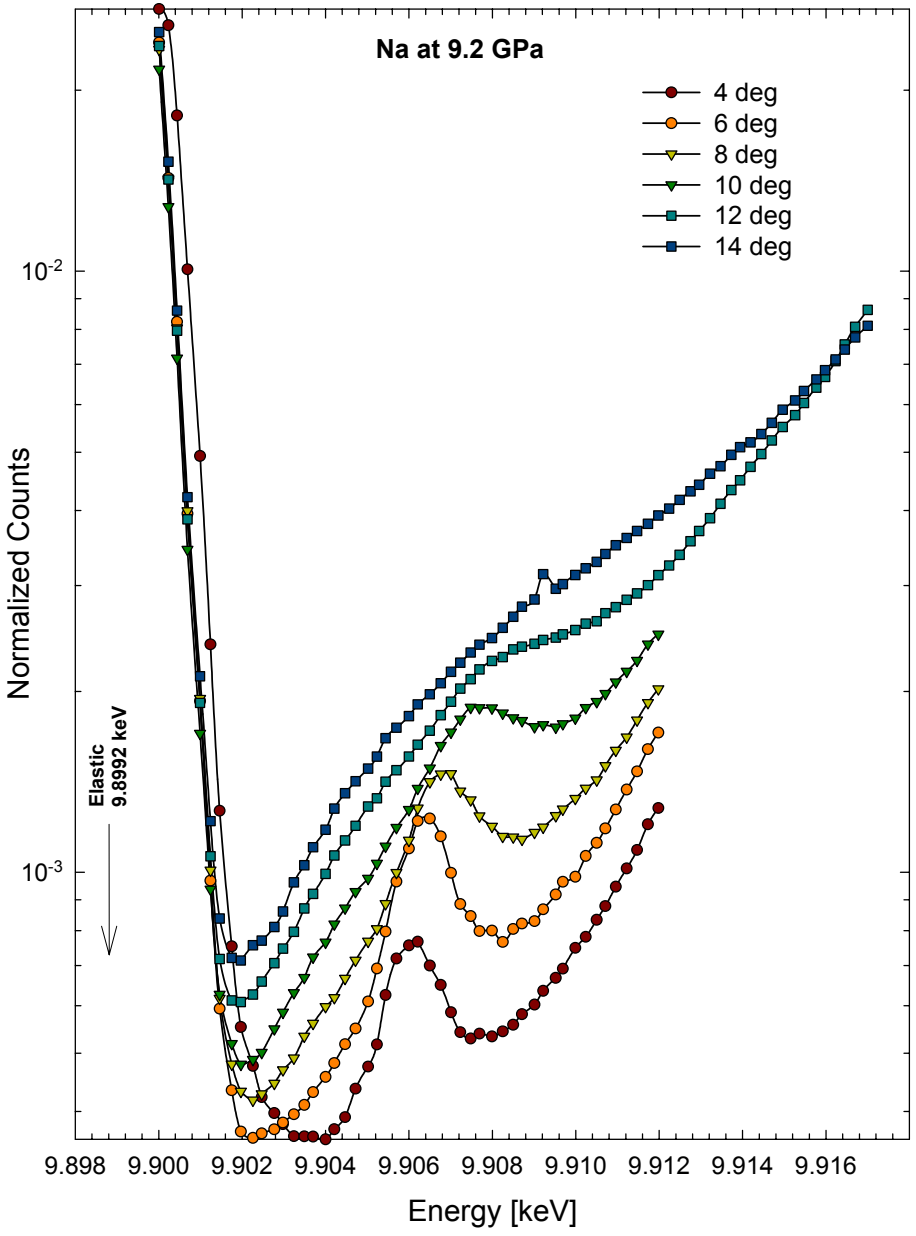


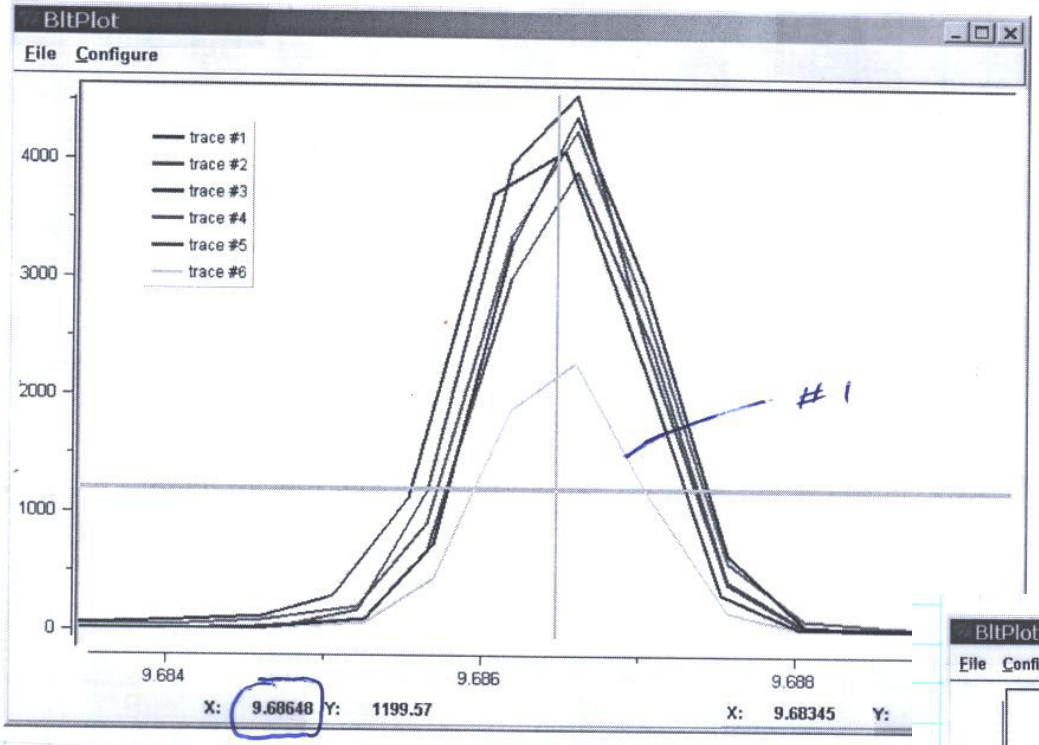
Setup for the Linear Six Element Inelastic X-ray Detector

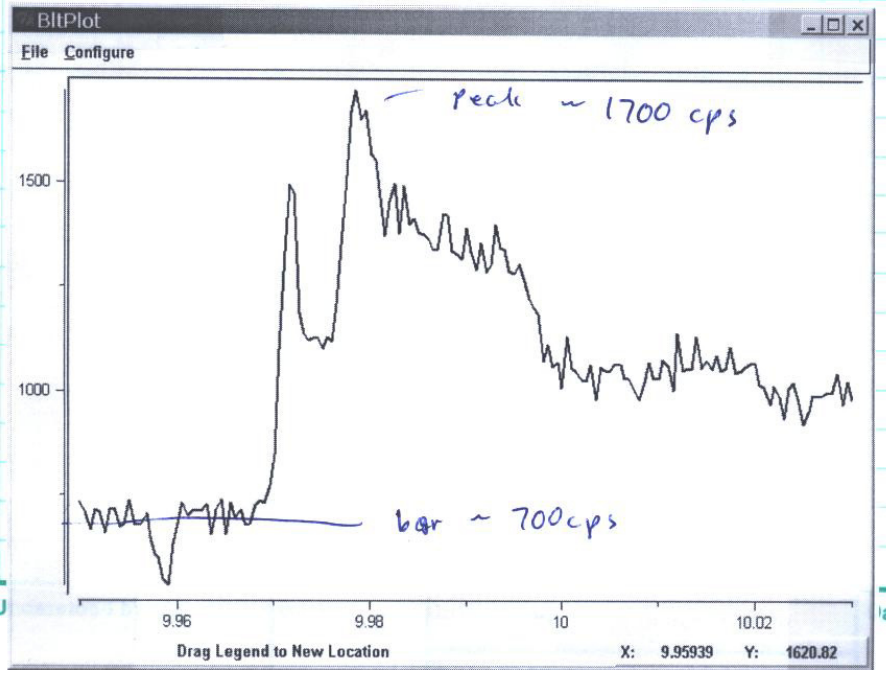


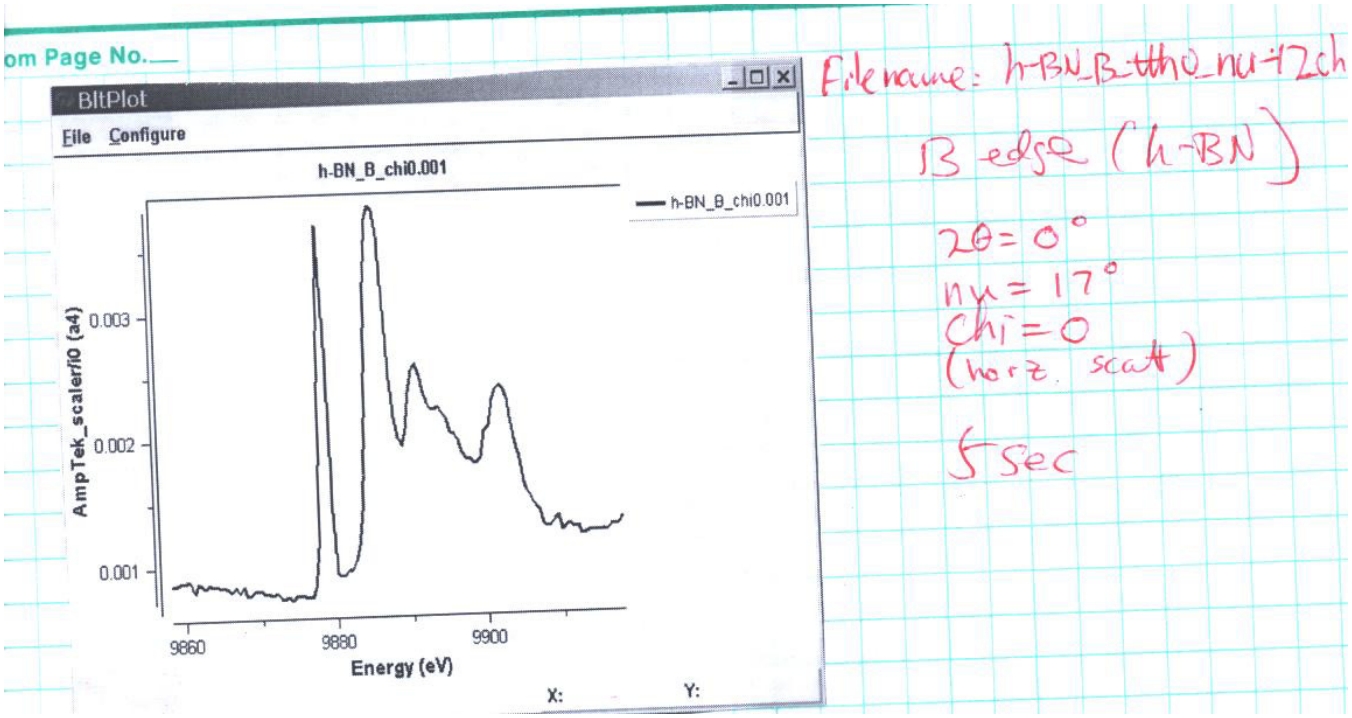
1. Center a small visible light scattering source on rotation circle.
2. Illuminate the ball with a laser so that the laser
3. With the detector in place adjust pitch and yaw
4. Have direct beam to strike one of the elements.
5. Cover the AmpTeK detector with a Pb stop and glue to the front of this stop a phosphor screen.
6. Set to backscatter engergy: E[keV] = 1.14146*sqrt(h^2+k^2+l^2). The Si 660 reflection 9.6856 keV.
7. Work at least 2 deg off of 180 deg the Bragg condition is approximately 1.5eV higher.
8. Center the scatter source on the rotation axis (thin glass fiber.)
9. Move the detector arm to 10 deg two theta, then yaw every elementtip (turns them off.)
10. One by one tip each back and optimize pitch and yaw, do an energy scan.
11. Tip yaw back on all detectors (turn them on) should have six times the intensity of an individual element.

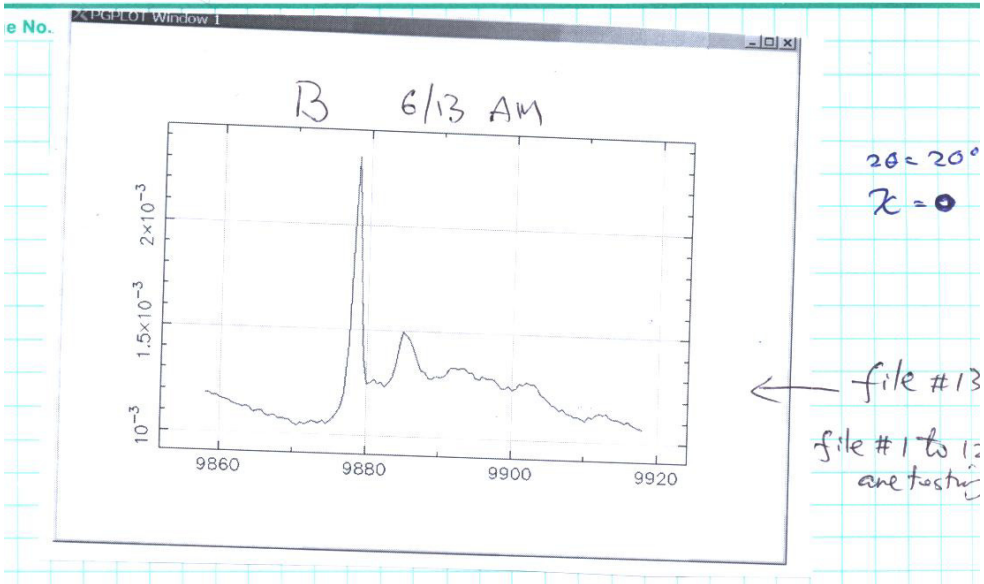

Normalized Counts
0.01
0.001
Elastic
9.8992 keV
Na Plasmon
Be Plasmon
9.895
9.900
9.905
9.910
9.915
9.920
Energy [keV]

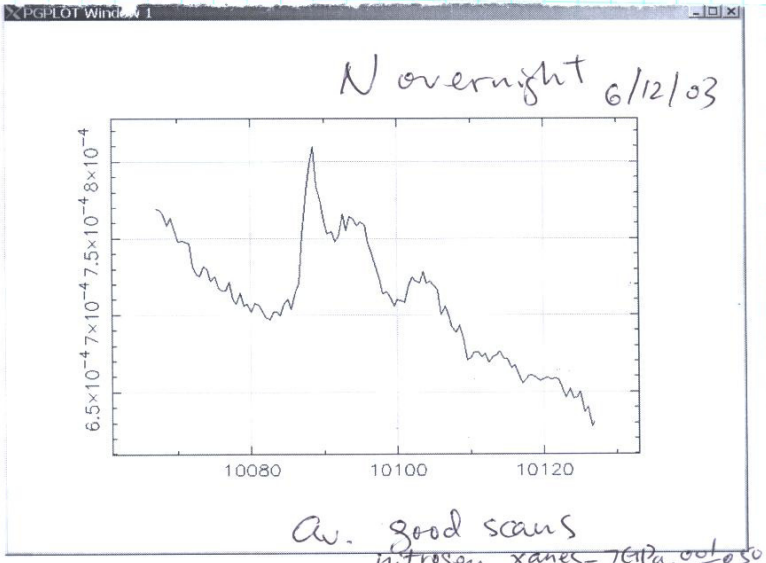

Na at 9.2 GPa
4 deg
6 deg
8 deg
10 deg
12 deg
14 deg
Normalized Counts
10^{-2}
10^{-3}
Elastic
9.8992 keV
9.898
9.900
9.902
9.904
9.906
9.908
9.910
9.912
9.914
9.916
Energy [keV]


BltPlot
File Configure
trace #1
trace #2
trace #3
trace #4
trace #5
trace #6
4000
3000
2000
1000
0
9.684
9.686
9.688
#1
X: 9.68648 Y: 1199.57
X: 9.68345 Y:


BltPlot
File Configure
Peak ~ 1700 cps
1500
1000
bar ~ 700cps
9.96
9.98
10
10.02
Drag Legend to New Location
X: 9.95939 Y: 1620.82

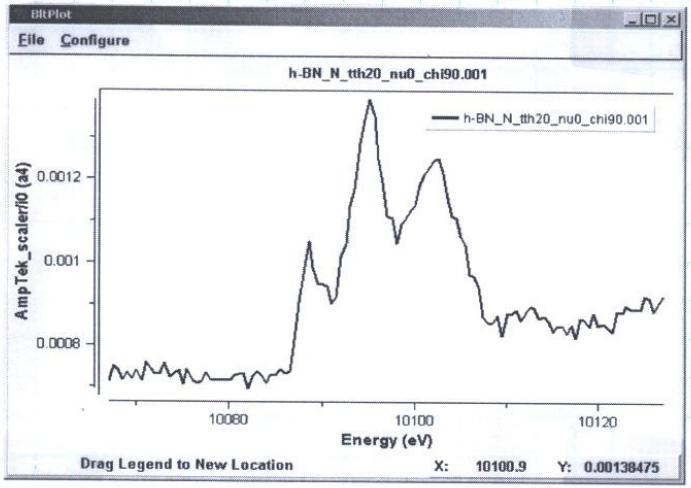

om Page No.
BltPlot
File Configure
h-BN_B_chi0.001
h-BN_B_chi0.001
AmpTek_scaler/i0 (a4)
0.003
0.002
0.001
9860
9880
9900
Energy (eV)
X:
Y:
Filename: h-BN_B-tth0_nu+12ch
B edge (h-BN)
2θ = 0°
nu = 17°
Chi = 0
(horz. scat)
5 sec


e No.
PGPLOT Window 1
B 6/13 AM
2×10⁻³
1.5×10⁻³
10⁻³
9860
9880
9900
9920
2θ = 20°
χ = 0
file #13
file #1 to 1
are testi



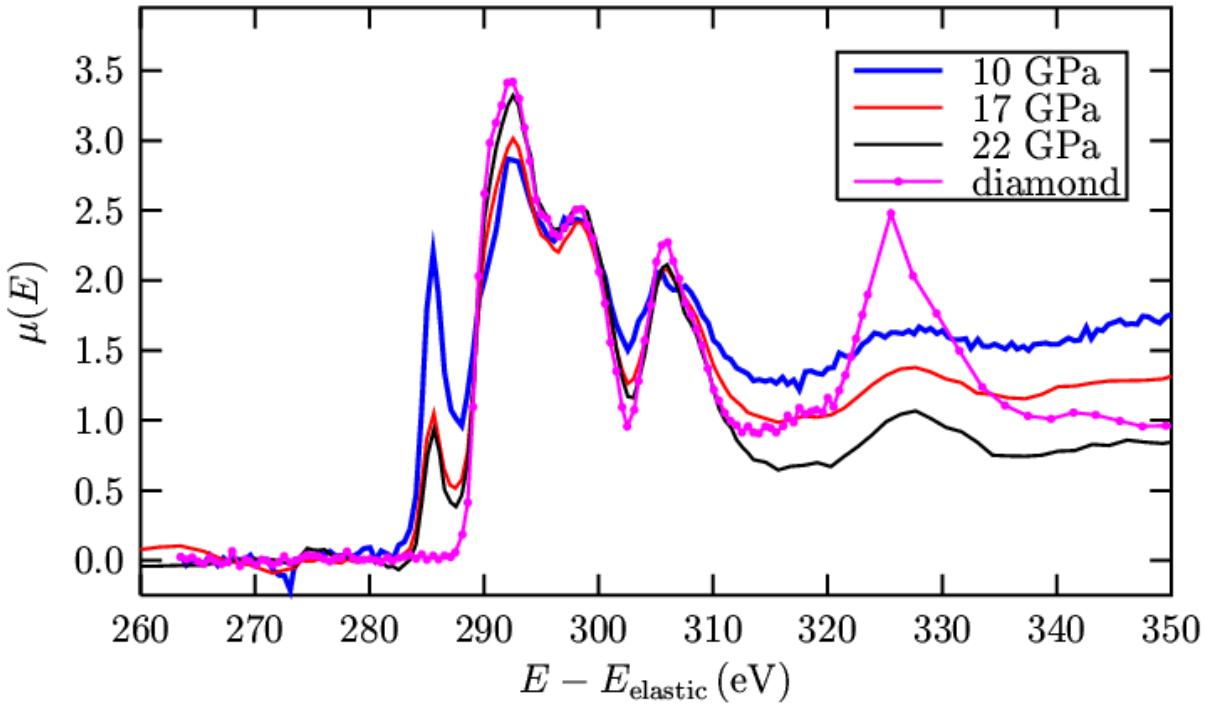
nitrogen_xane
scans 1-5
2θ = 20°
χ = 0

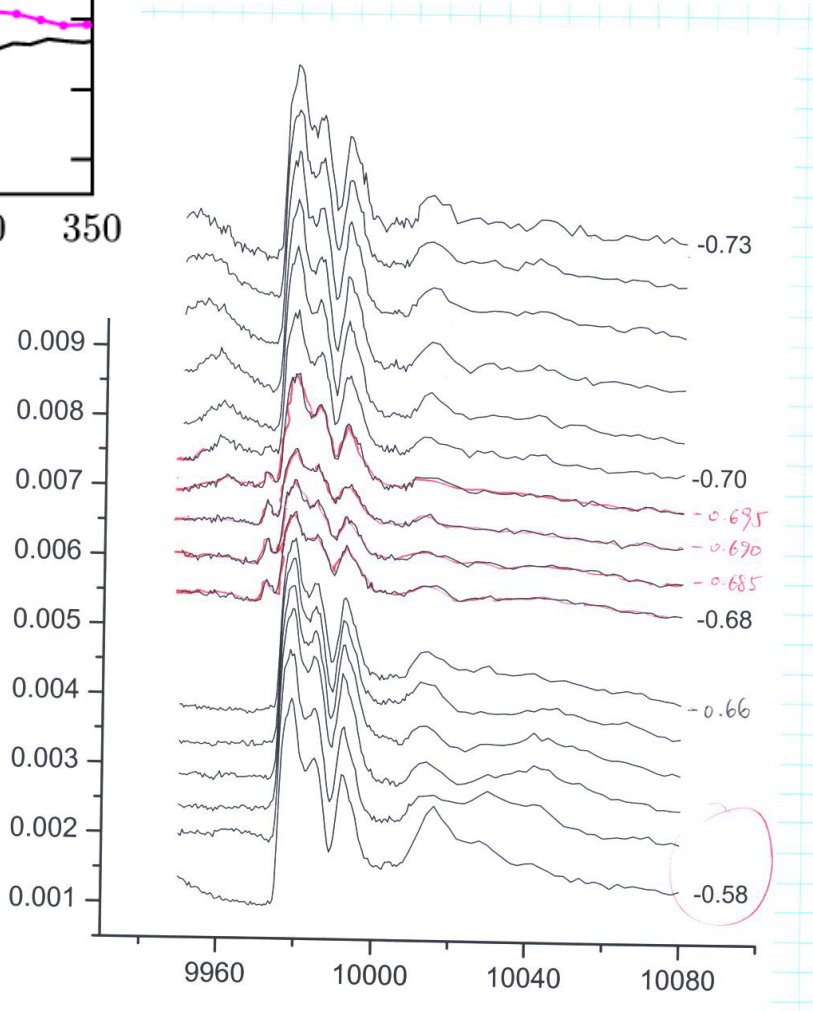
Page No.

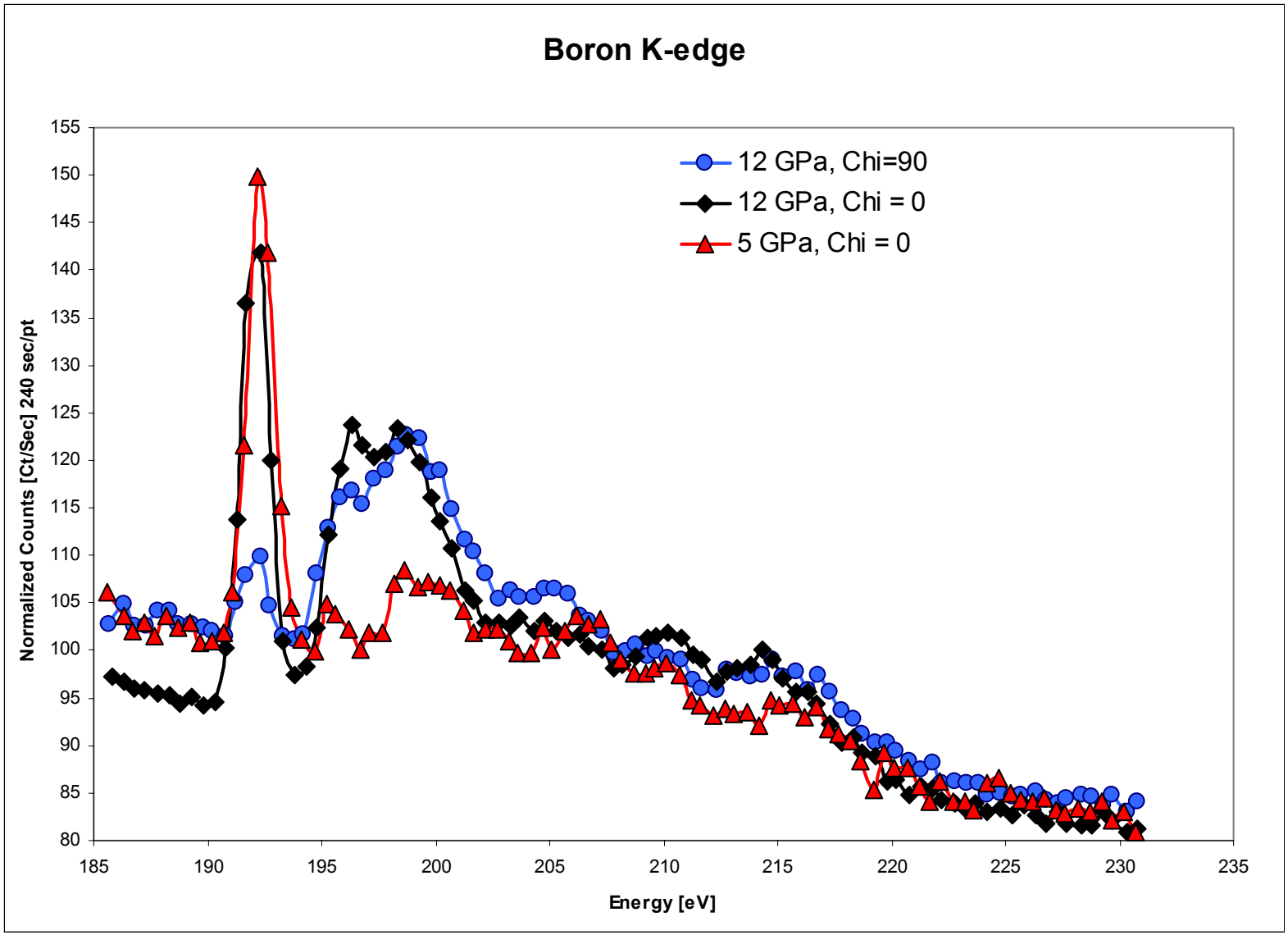


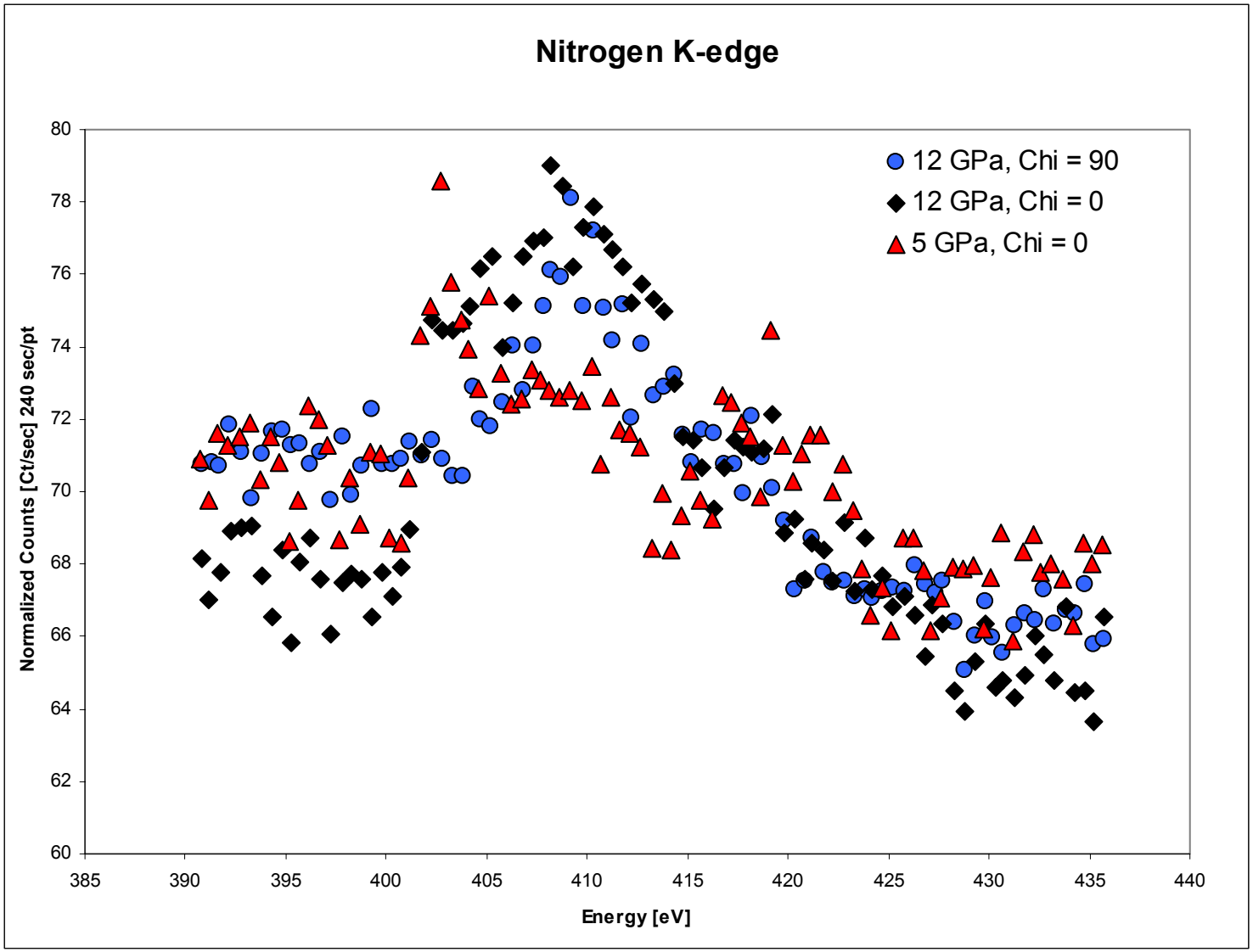
N-edge
2θ = 20°
nu = 0
Chi = 90°
10 sec

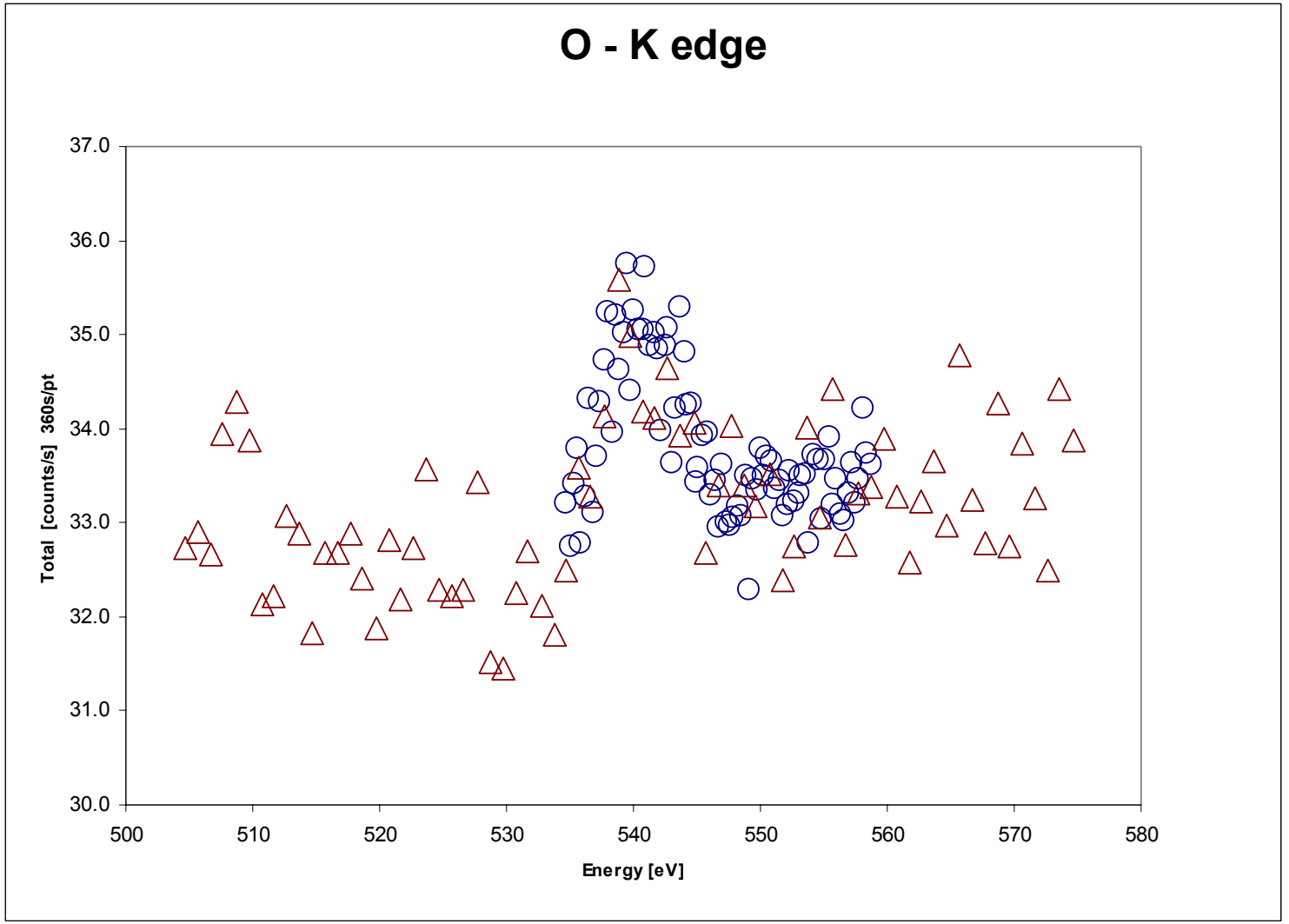
DONE w/ IXS


10 GPa
17 GPa
22 GPa
diamond
$\mu(E)$
$E - E_{\text{elastic}}$ (eV)


-0.73
-0.70
-0.695
-0.690
-0.685
-0.68
-0.66
-0.58


Boron K-edge
12 GPa, Chi=90
12 GPa, Chi = 0
5 GPa, Chi = 0
Normalized Counts [Ct/Sec] 240 sec/pt
Energy [eV]
155
150
145
140
135
130
125
120
115
110
105
100
95
90
85
80
185
190
195
200
205
210
215
220
225
230
235


Nitrogen K-edge
12 GPa, Chi = 90
12 GPa, Chi = 0
5 GPa, Chi = 0
Normalized Counts [Ct/sec] 240 sec/pt
Energy [eV]
80
78
76
74
72
70
68
66
64
62
60
385
390
395
400
405
410
415
420
425
430
435
440


O - K edge
Total [counts/s] 360s/pt
37.0
36.0
35.0
34.0
33.0
32.0
31.0
30.0
500
510
520
530
540
550
560
570
580
Energy [eV]