Proposal for Hard X-Ray Beam Power and Beam Position Monitors

Test of Feasibility Version

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Two Devices Needed

- Beam Power Monitor
- Hard X-Ray Beam Position Monitor

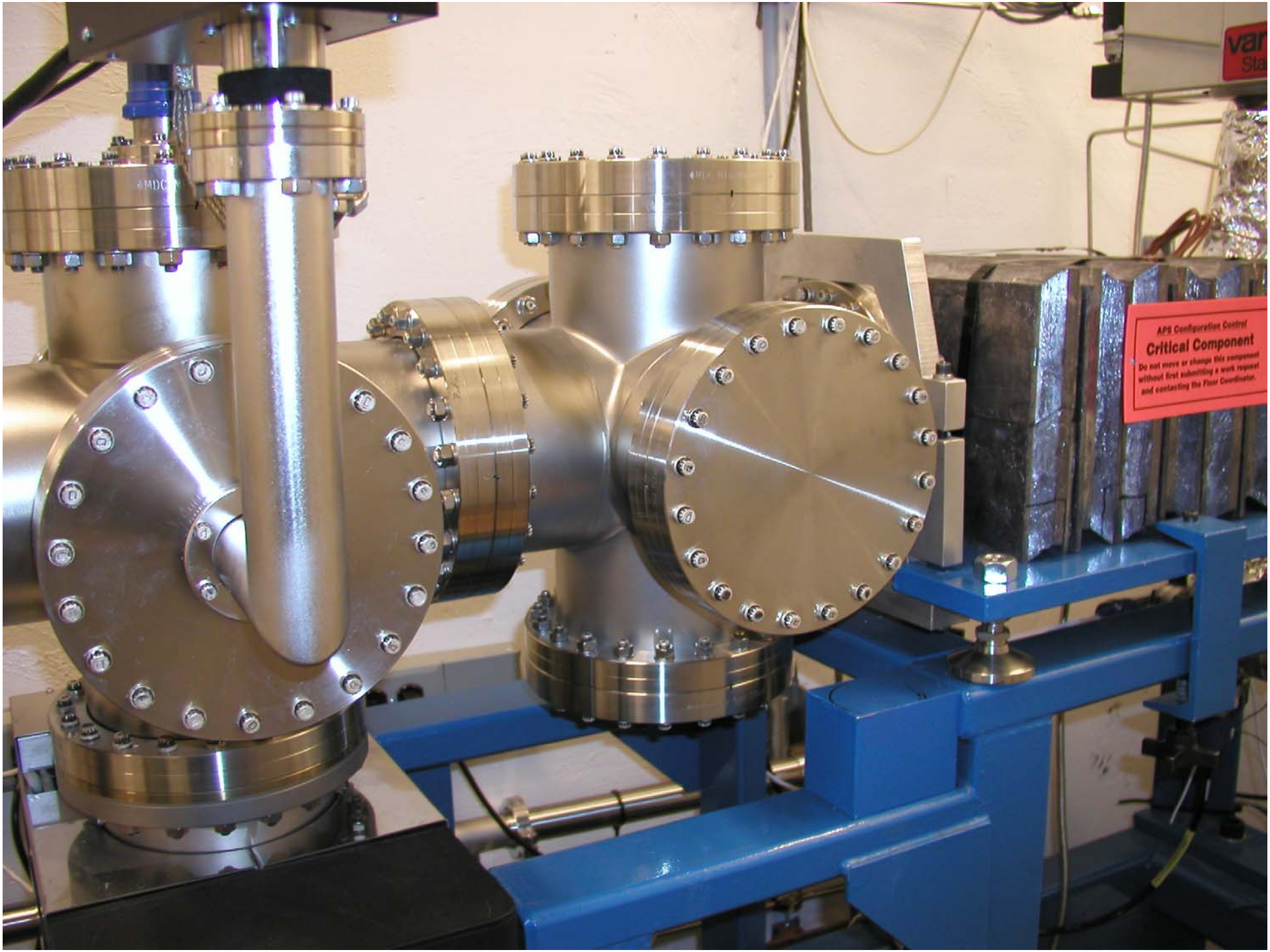
Beam Power Monitor

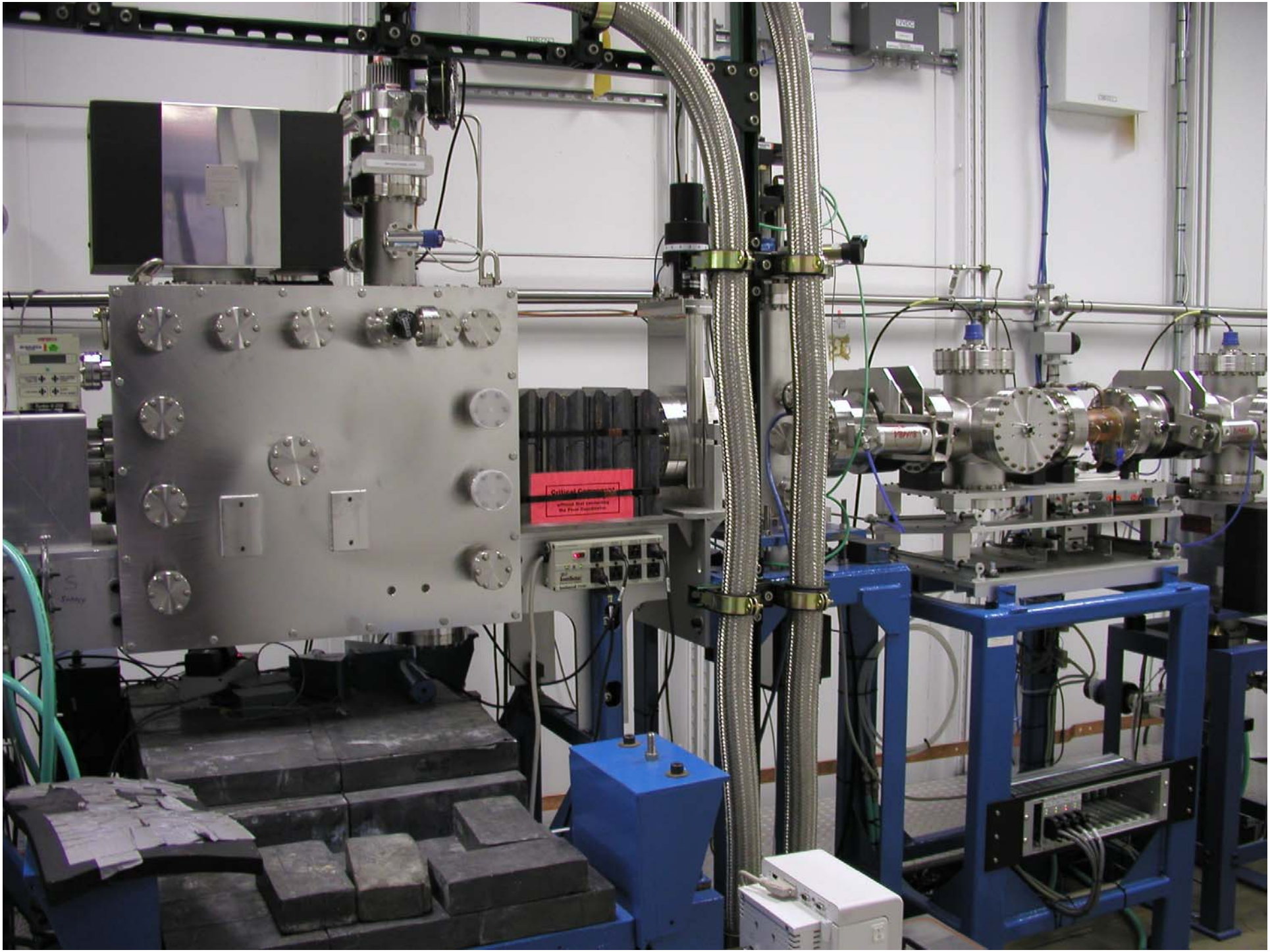
- Needed for centering undulator beam on beam defining mask in FOE
- Destructive, retractable (not permanent)
- Located immediately downstream of first beam defining mask
- Fast (fluorescence) and DC (thermal sensors)
- Filtering to match power width to width of beam defining aperture (for highest position sensitivity)

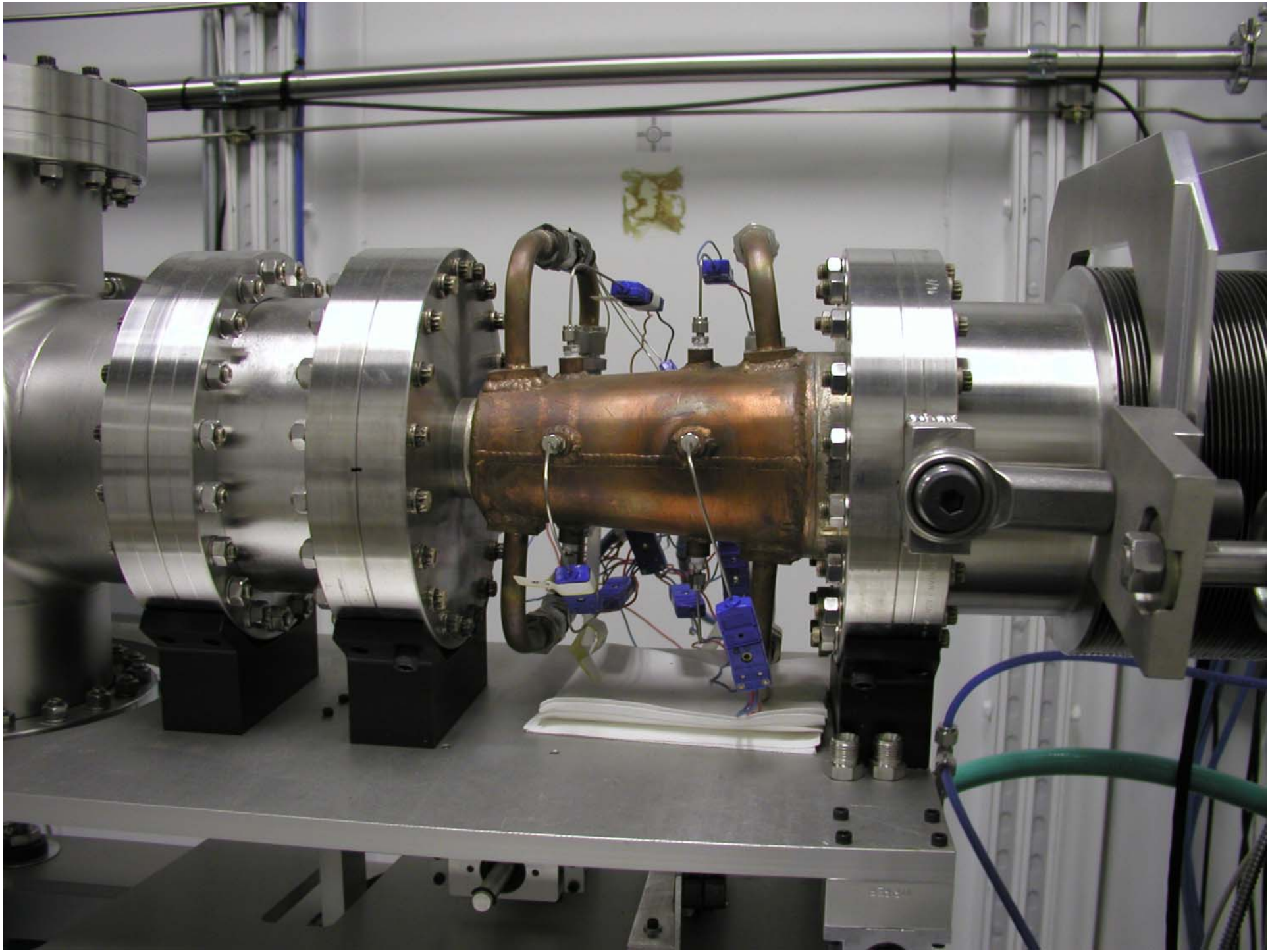
Hard X-Ray Beam Position Monitor

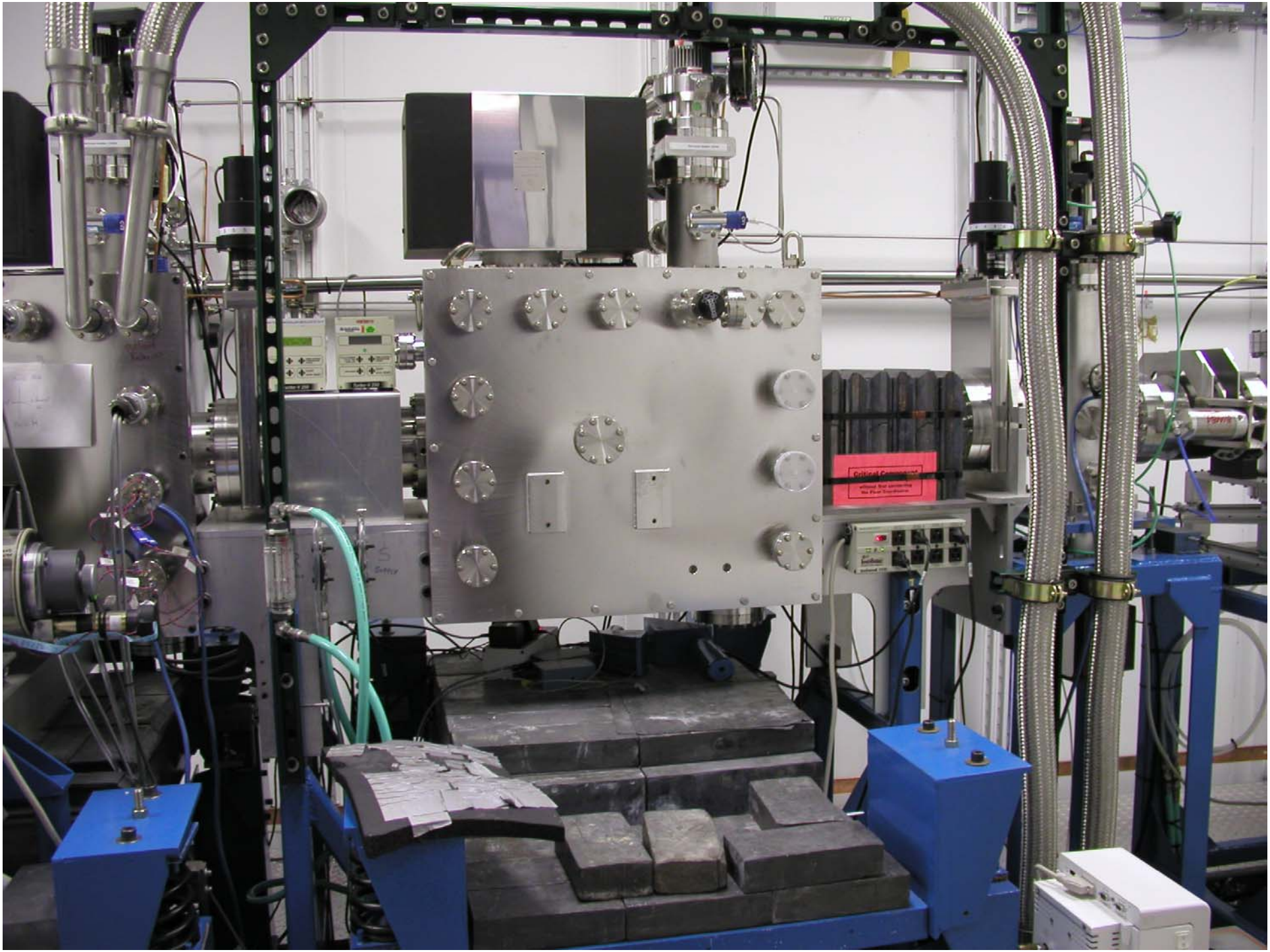
- Non-destructive
- For feedback to orbit control
- Fast (fluorescence) and DC (thermal)
- 9 keV threshold (Cu fluorescence) rejects most of dipole emission
- Located upstream of main shutters (final product)
- Filter array in front (narrower peak, power reduction)
- Sensors: doped diamond (final), PIN-diodes (test)


varian
StarCell
Critical Component
varian

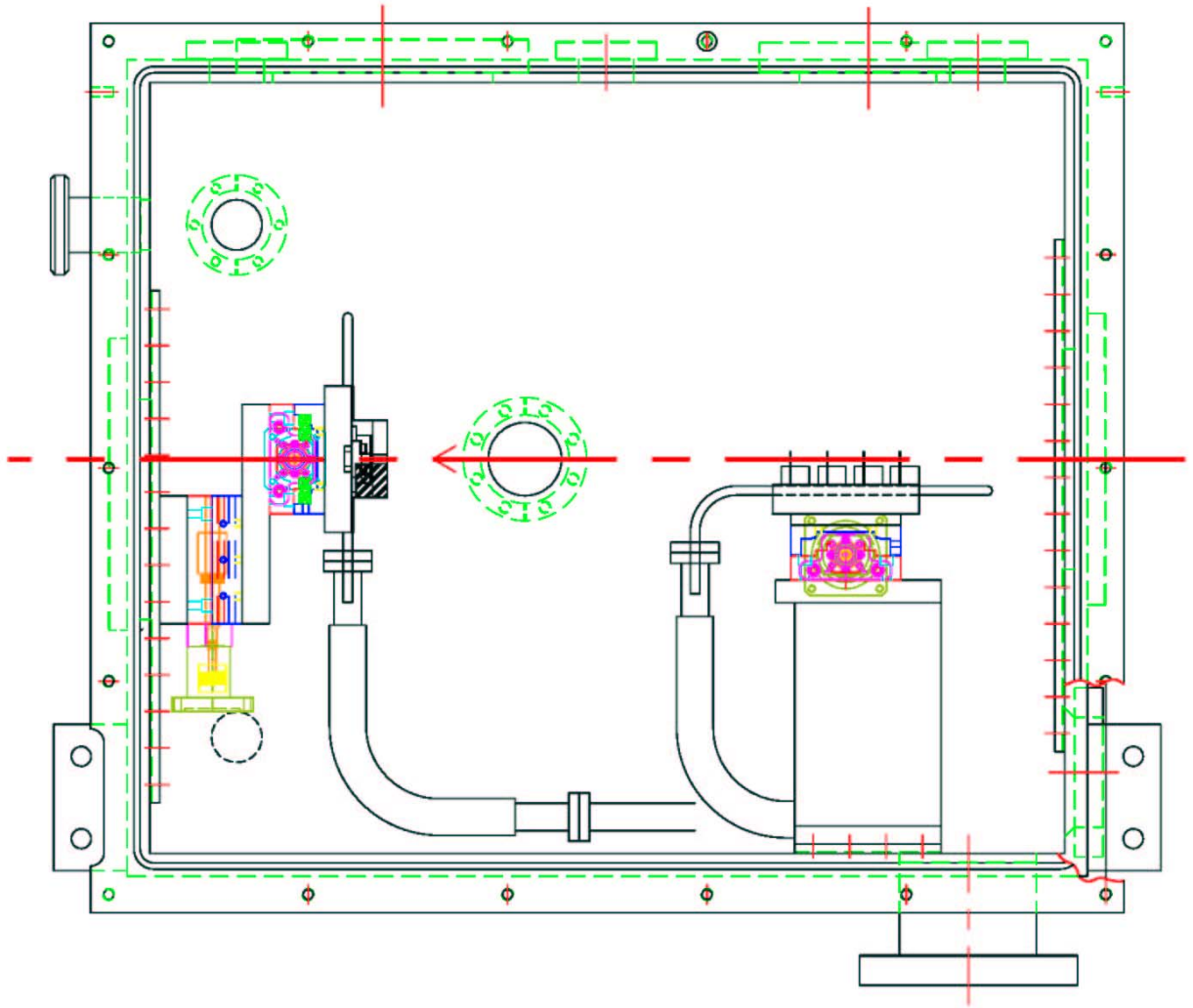

APS Configuration Control
Critical Component
Do not move or change this component without first submitting a work request and contacting the Floor Coordinator.



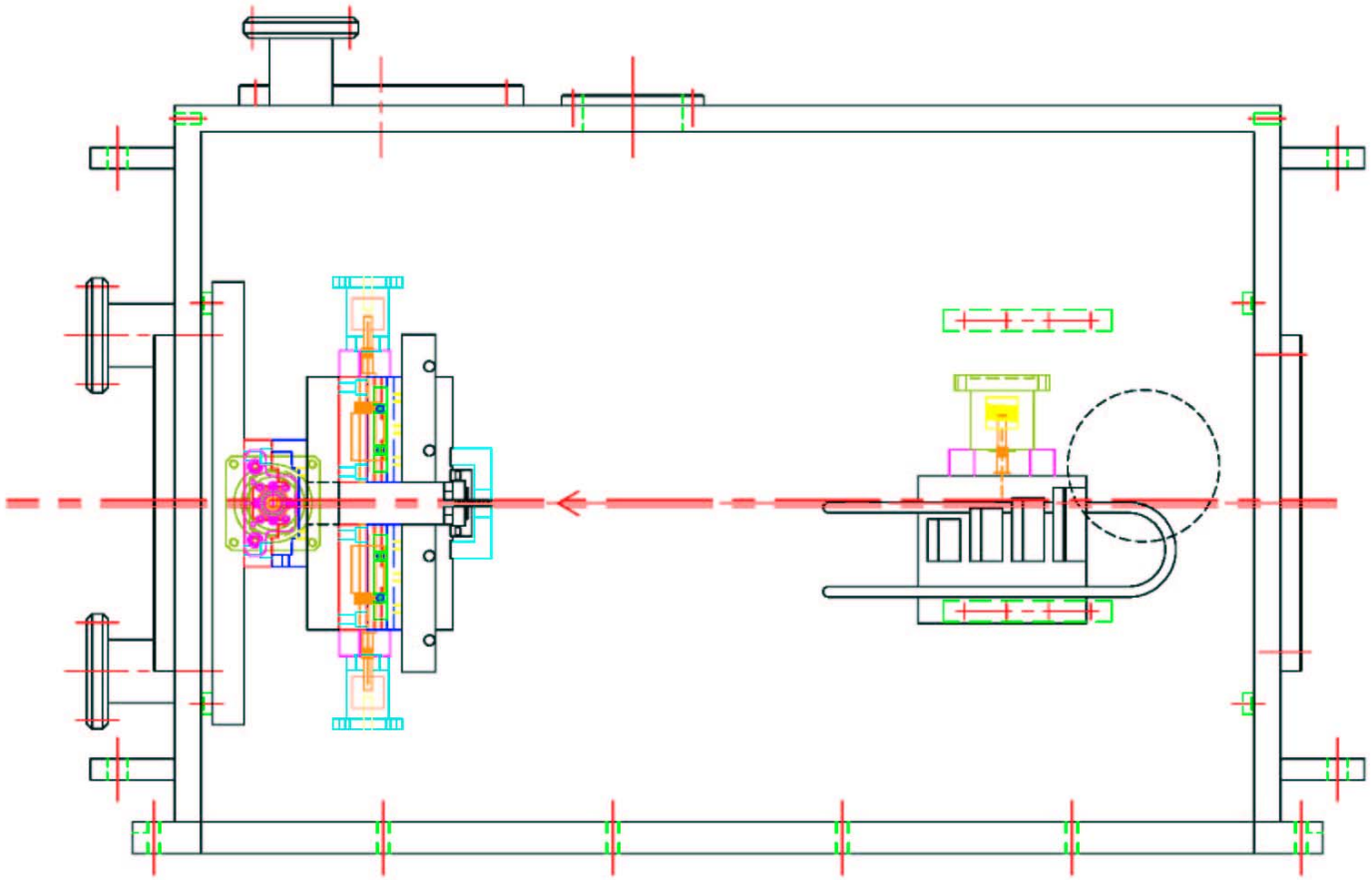




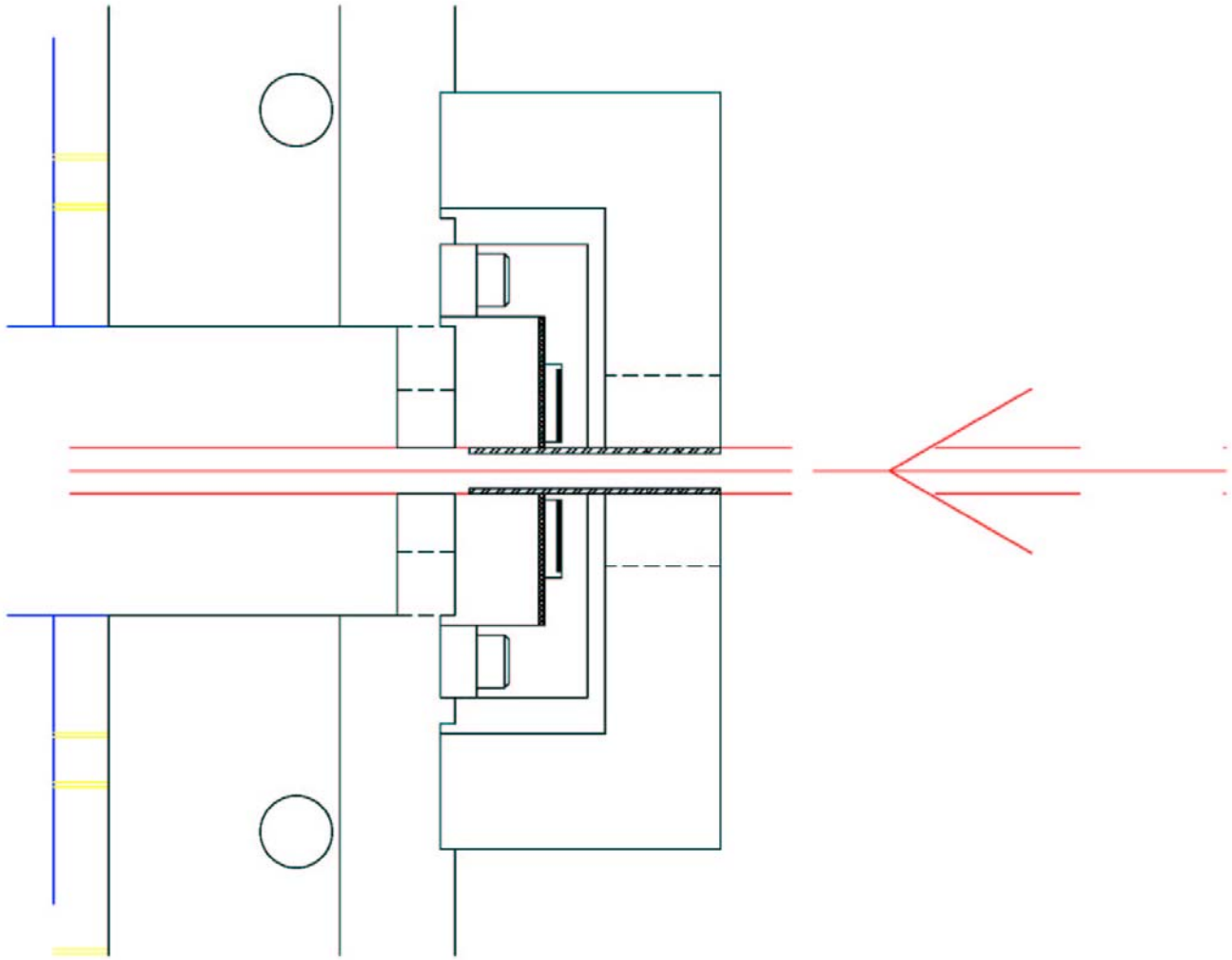
White Beam Monitor and Filter Assembly in Tank at 52.6 m Elevation



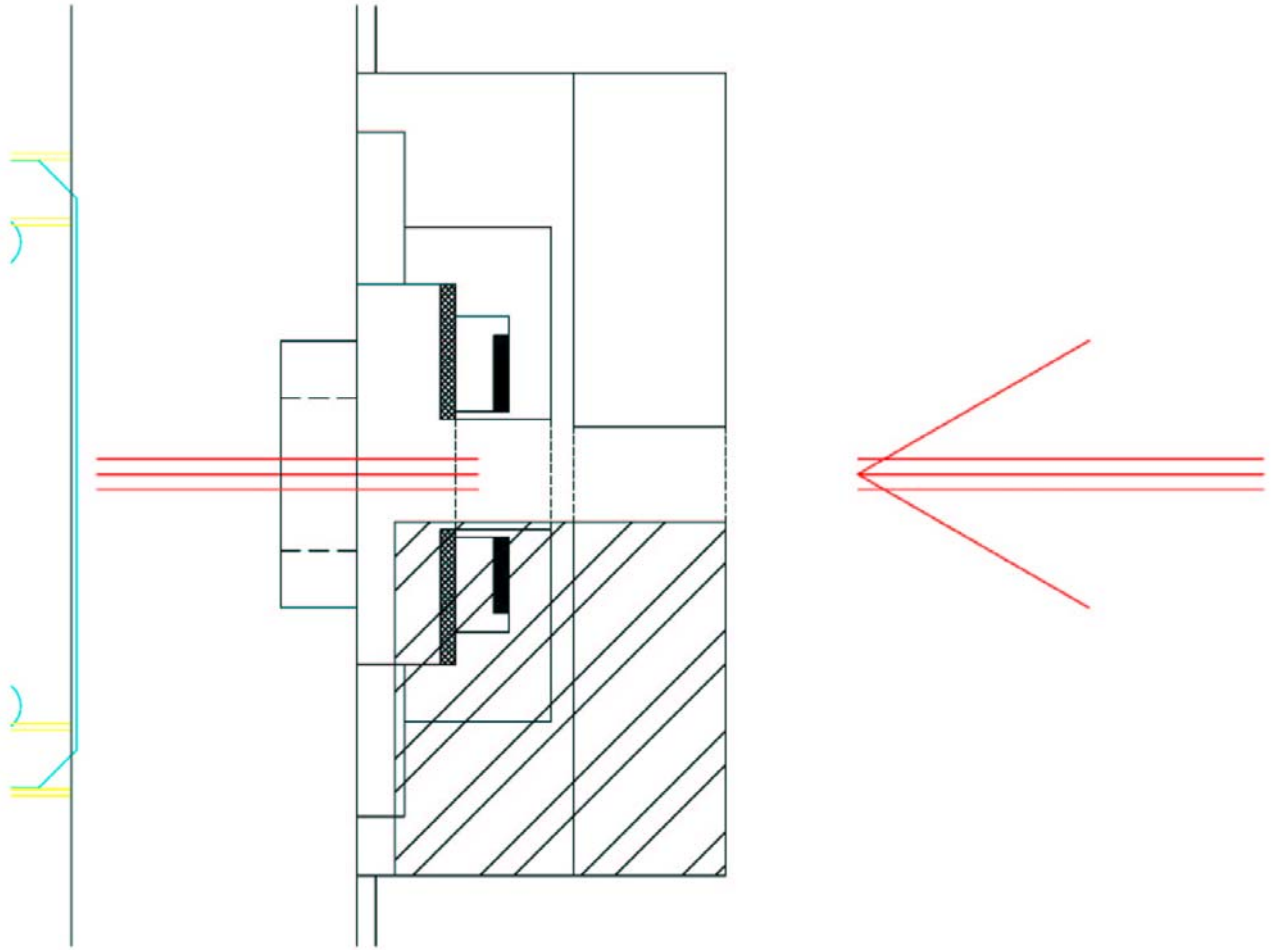
White Beam Monitor and Filter Assembly in Tank at 52.6 m
Top View

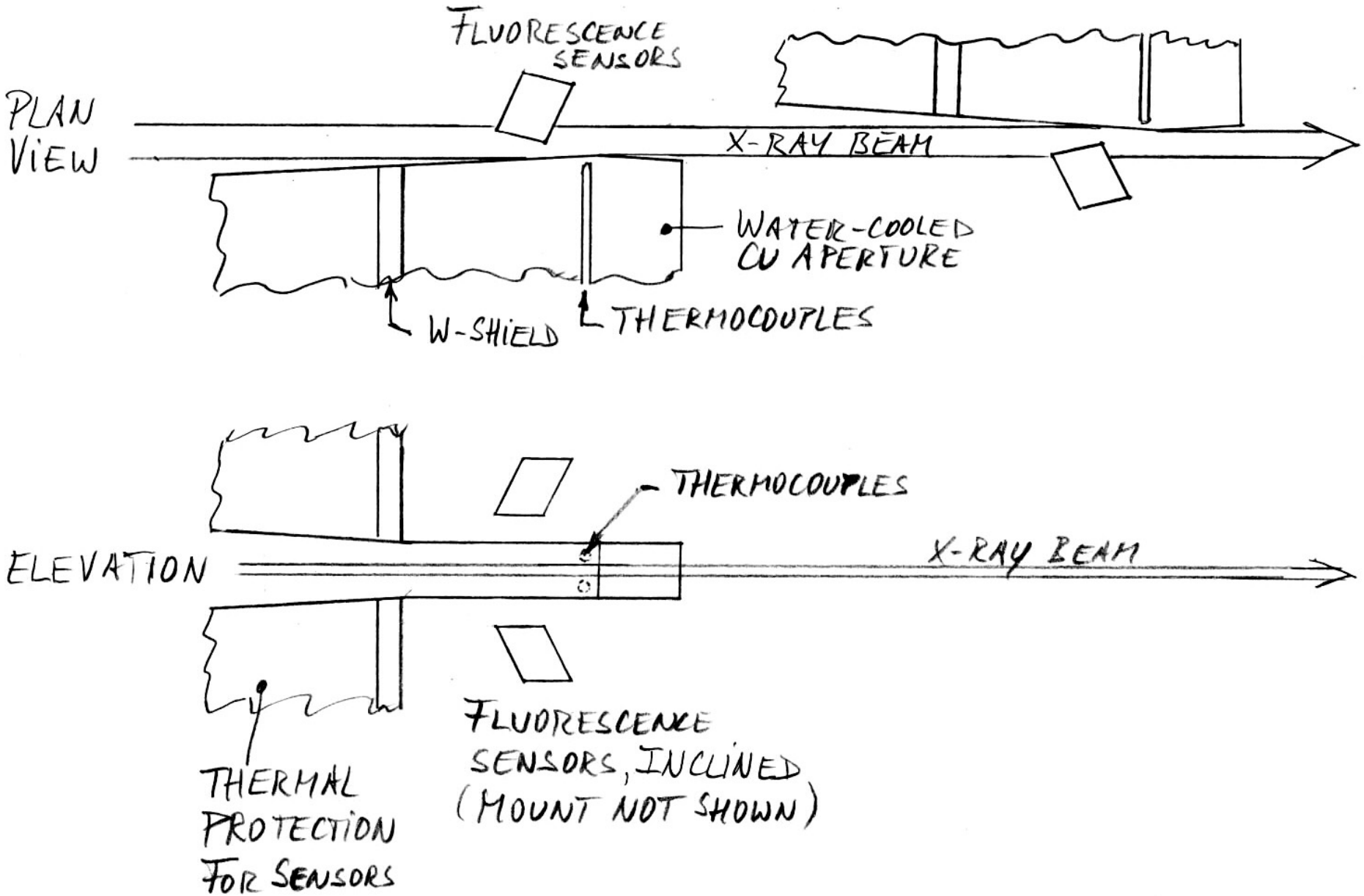


White Beam Monitor Detail - Top View



White Beam Monitor Detail- Elevation

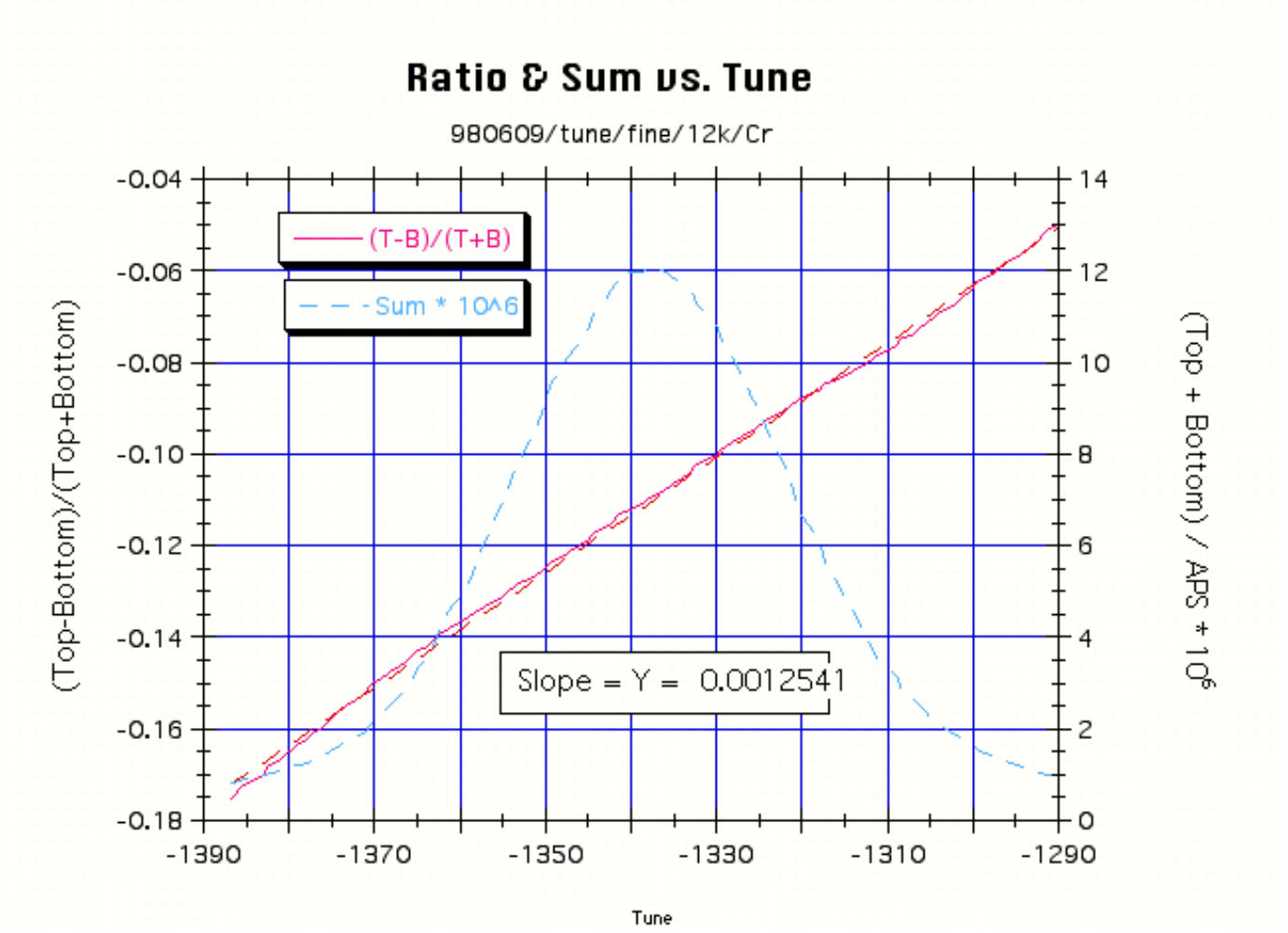



FLUORESCENCE SENSORS
PLAN VIEW
X-RAY BEAM
WATER-COOLED CU APERTURE
W-SHIELD
THERMOCOUPLES
THERMOCOUPLES
ELEVATION
X-RAY BEAM
FLUORESCENCE SENSORS, INCLINED (MOUNT NOT SHOWN)
THERMAL PROTECTION FOR SENSORS

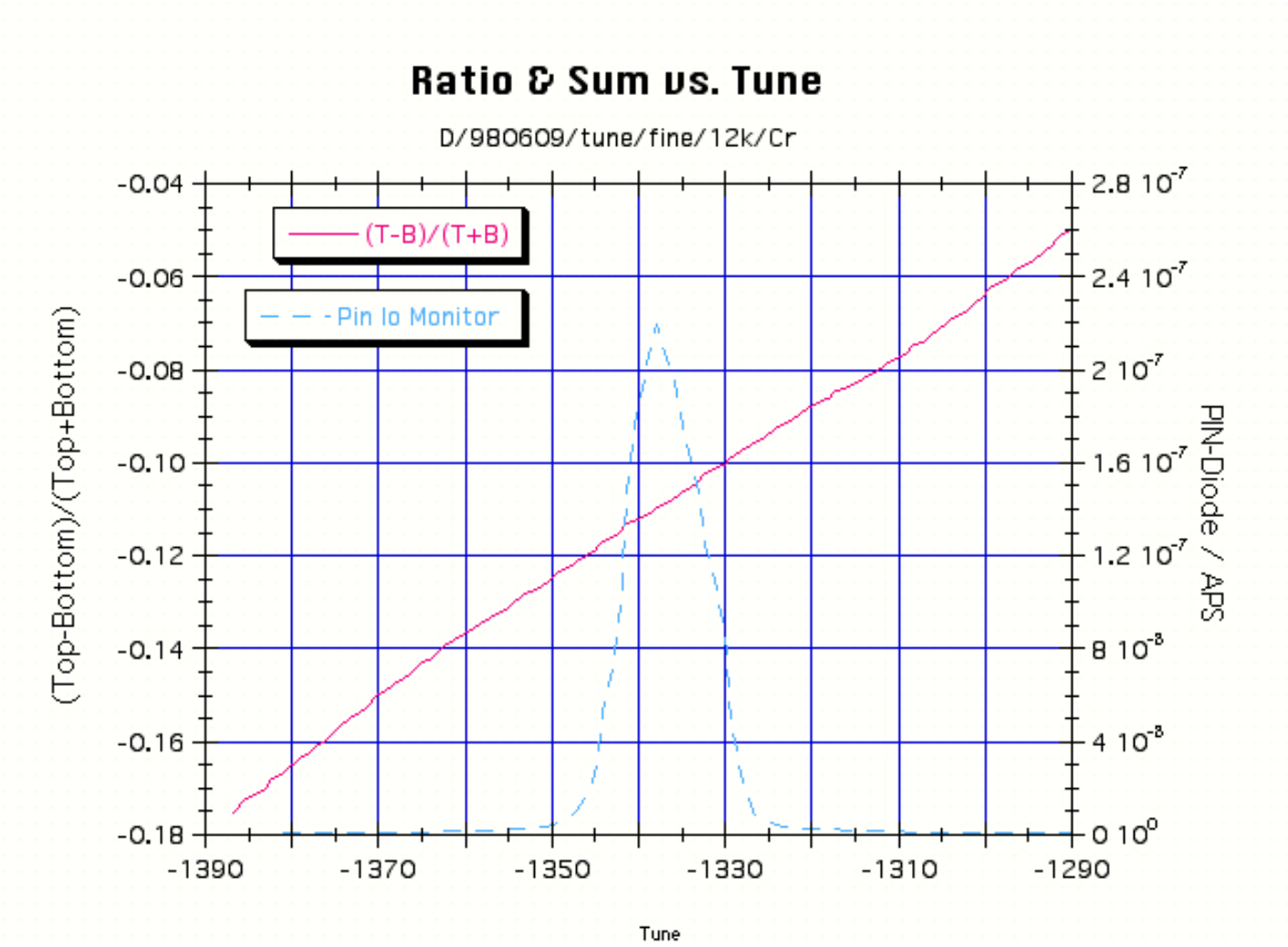
Cost Estimates

Slides: Vac. ready, ball screw version	4 required	$ 8,000
Motors: Vac. ready with encoders	4 required	$ 2,000
Limit switch assemblies	4 sets required	$ 800
Bellows	6 required	$ 3,500
Electrical feedthroughs	7 required	$ 2,500
Brazed cooling tube assemblies	3 required	$ 5,000
Additional machined parts		$ 7,000
(plates, blocks, shields, water feedthrough flange, etc.)		
Total for parts		$28,800
Time: Documentation & procurement		$ 5,000
Total, including shipping charges		$34,000
Contingency		$ 3,000
Requested (preliminary)		$37,000

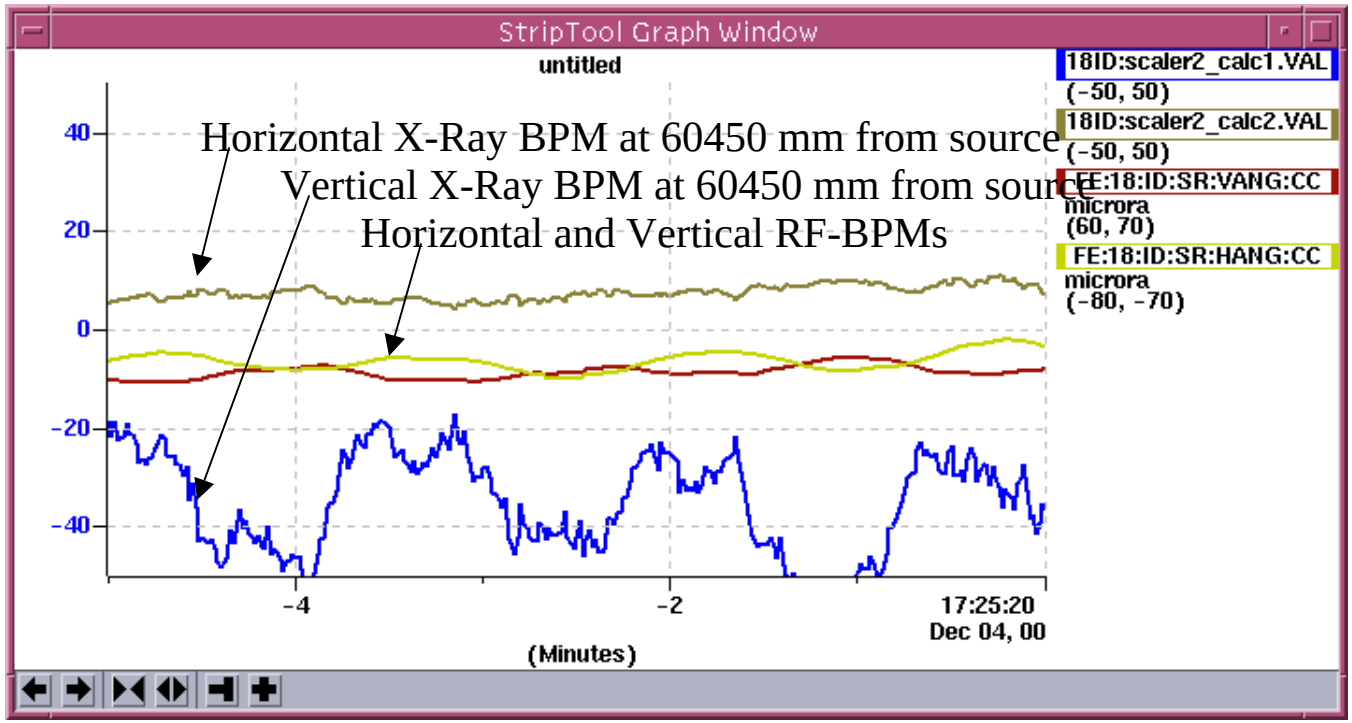
Linearity and Dynamic Range of Monochromatic BPM



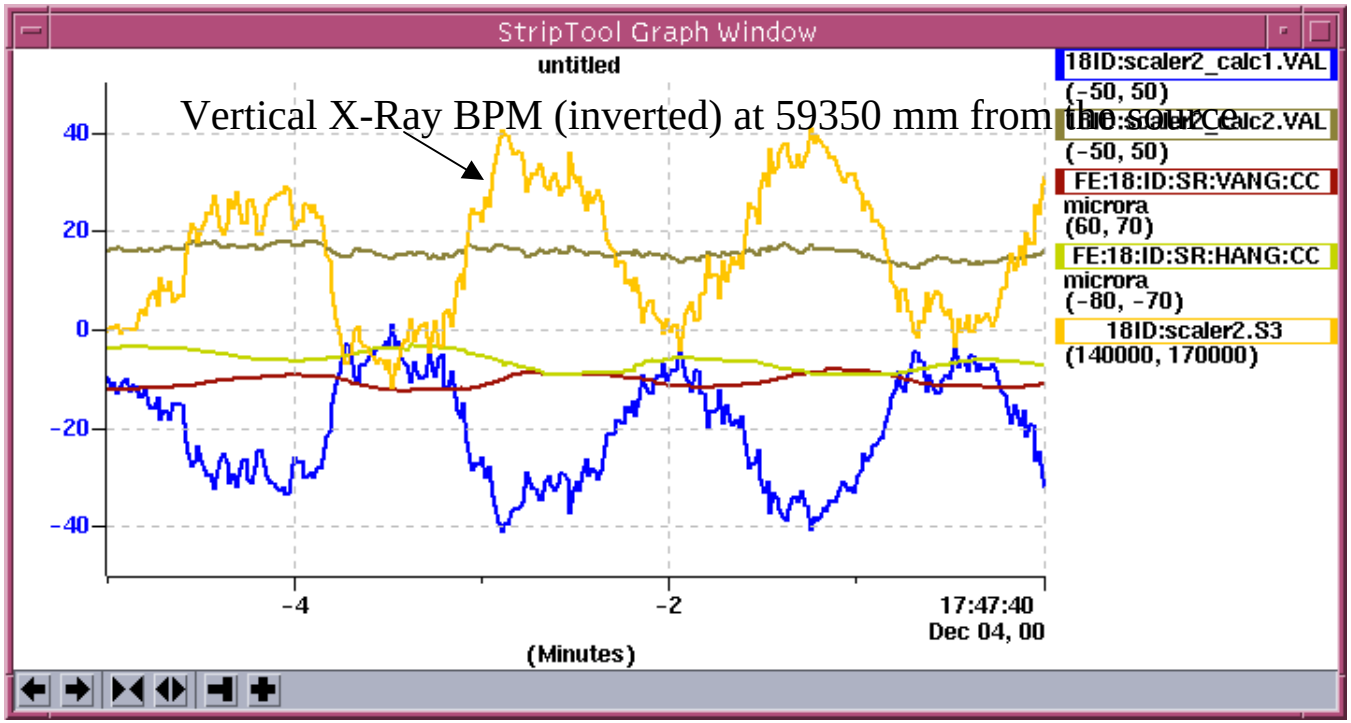
Dynamic range of monochromatic BPM



RF BPM vs X-Ray BPM



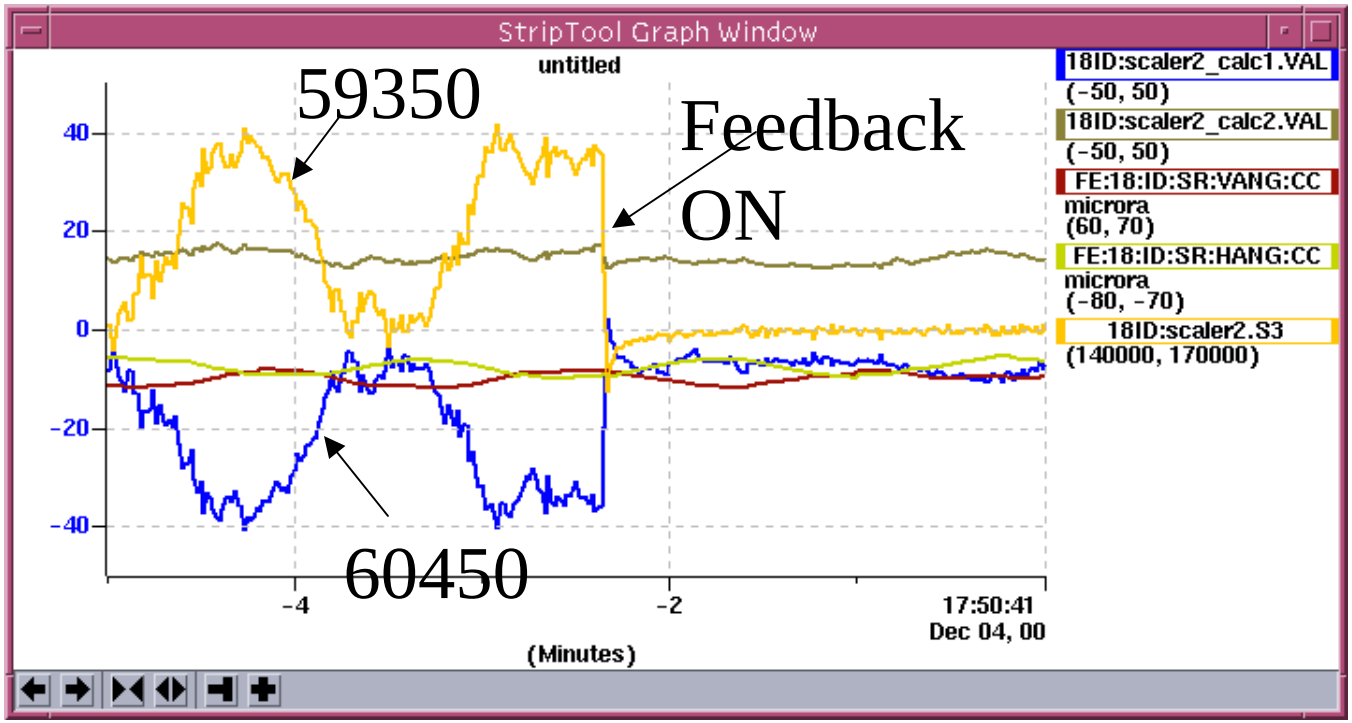
RF BPM vs X-Ray BPM



Closed Loop Positional Feedback

BPM at 59350 mm drives angle of second crystal

BPM at 60450 mm records position further downstream



Closed Loop Feedback Test

BPM at 59350 mm is moved in 10 micron steps

BPM at 60450 mm records effect downstream