ATF2 Alignment

J.W. Flanagan

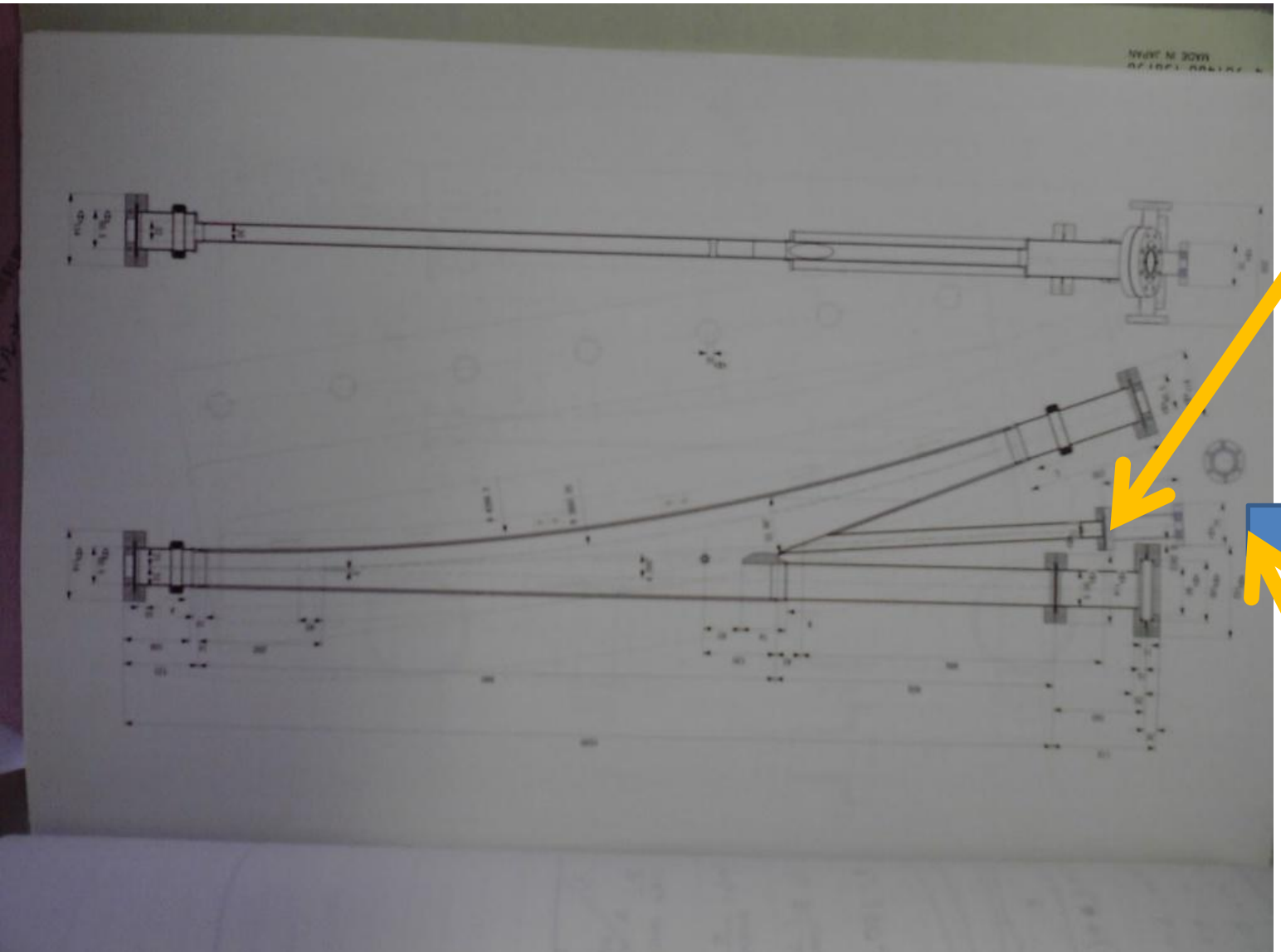
STURM Meeting

2010.12.08

Up to 2010.11.26

- PMT + Ce:YAG scintillator at 170 mm downstream of Be extraction window shows center of beam is shifted outwards ~5 mm.
  - Measured width of beam ~ 10 mm (= diameter of Be window)
  - Measured height of beam ~ 1 mm or less (~0.5 mm expected)
- Projected beam hits x-ray beam pipe wall!

Extraction Chamber

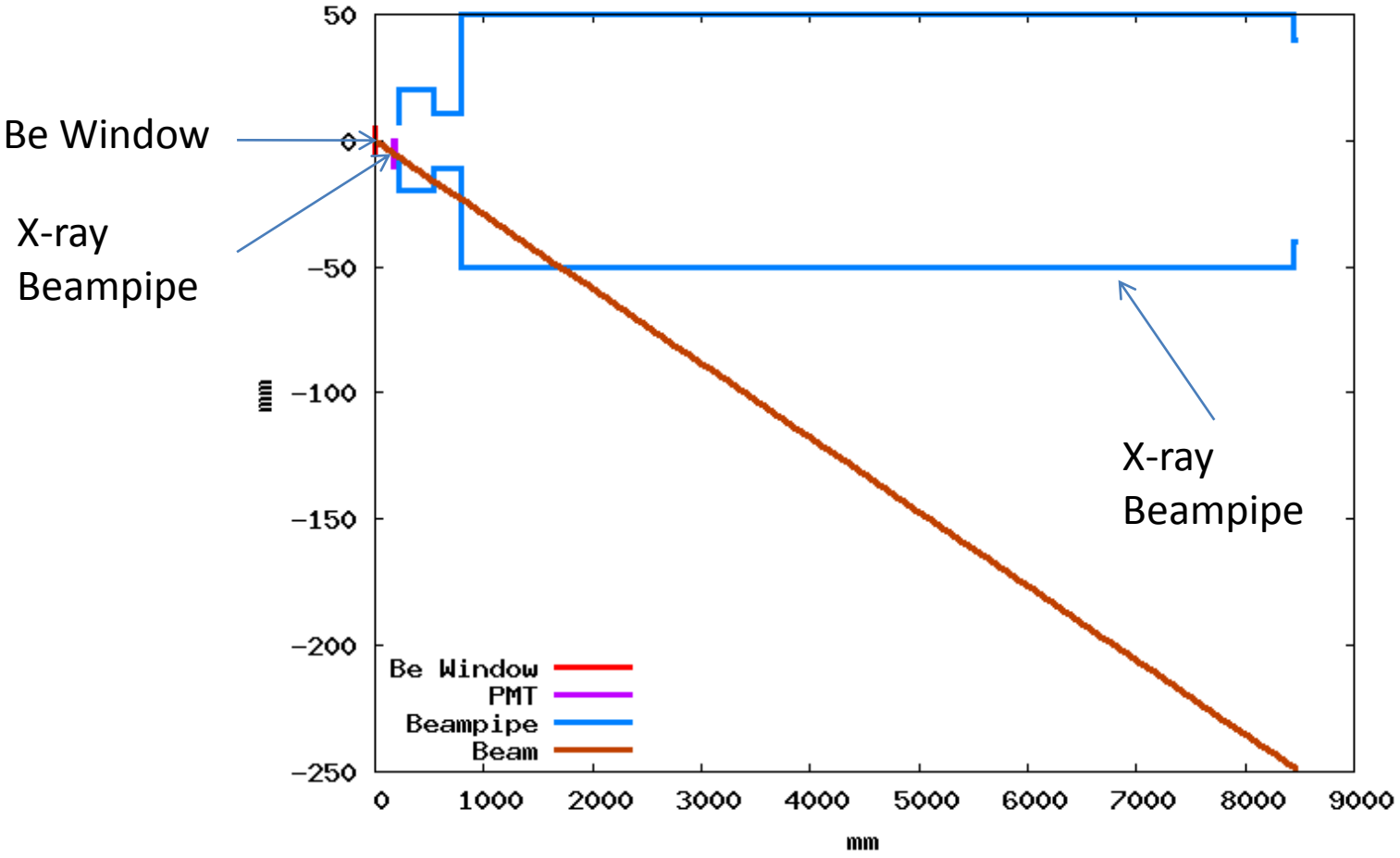


Be Window

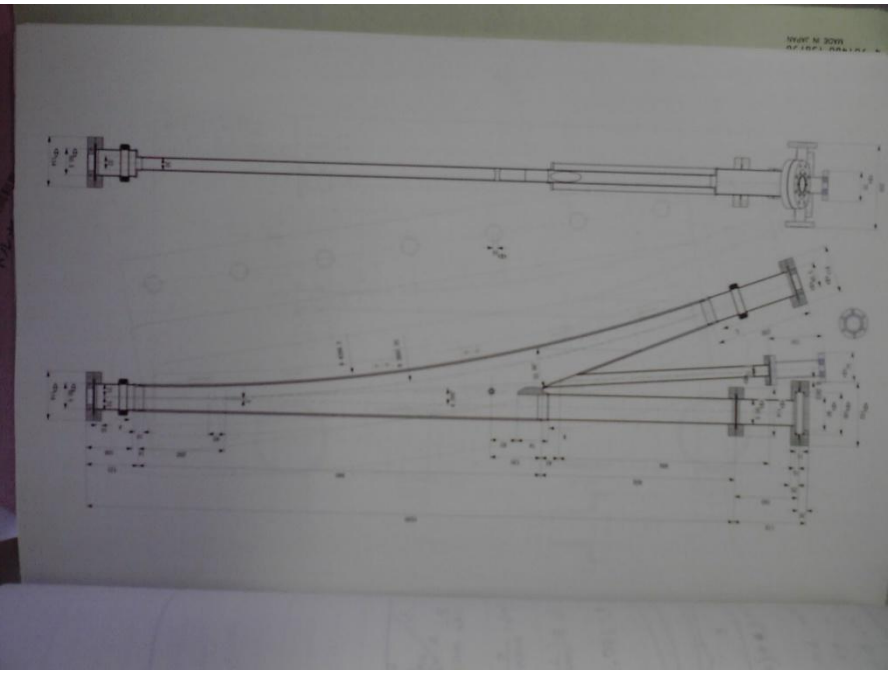
X-ray
Beampipe

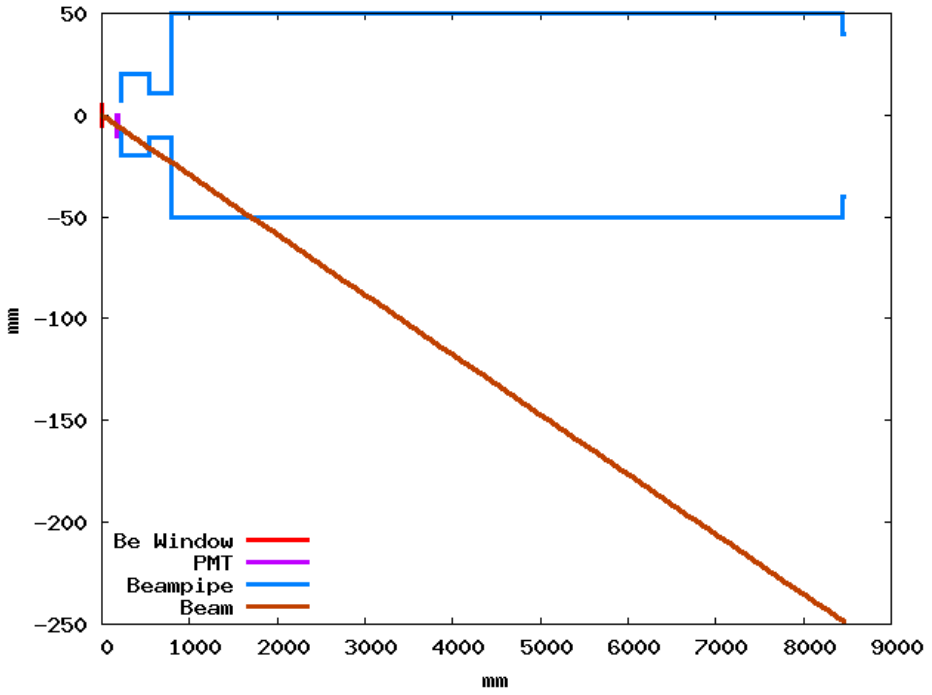
PMT+Ce:YAG
Scintillator

Measured (Mis-)Alignment 2010.11.25



Put together (Scales not matched)

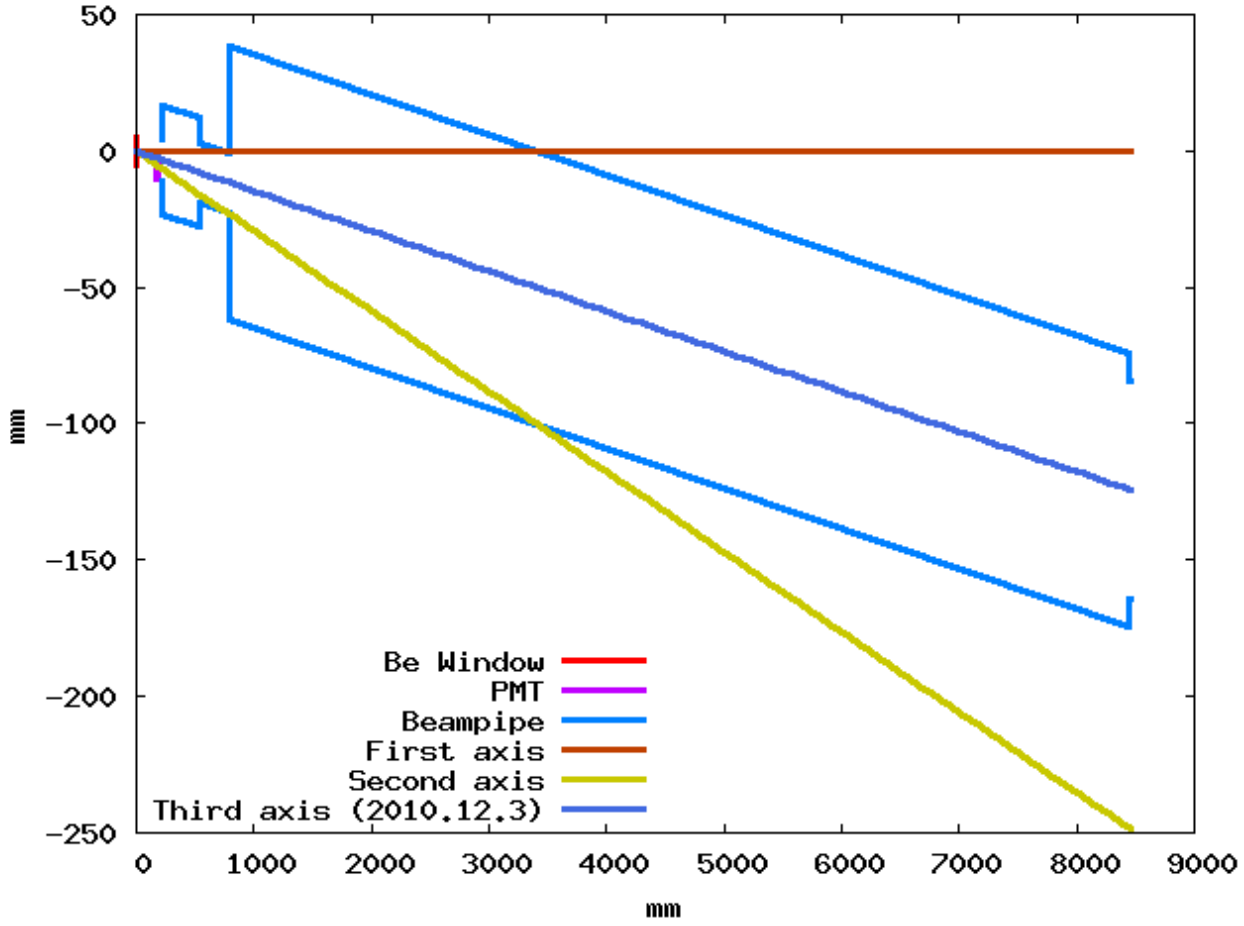




Beam pipe alignment

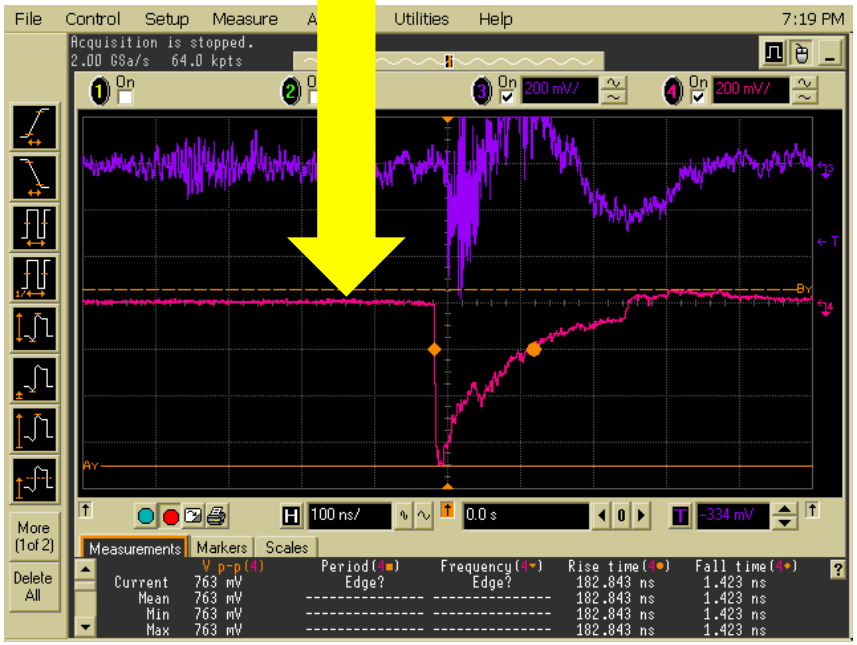
- Moved (by hand) x-ray beam pipe to be in rough alignment with measured x-ray beam axis.
  - Almost exactly matched originally predicted axis based on chamber diagram.
  - However, based on a huge extrapolation
    - PMT measurement made ~15 cm from extraction window
    - Extrapolated out to ~8.5 m from extraction window
- Failed to find beam at end of beam pipe…
- Dec. 3: Tried moving beam pipe to intermediate position between original position and second position
  - Beam found!

Alignment as of 2010.12.03

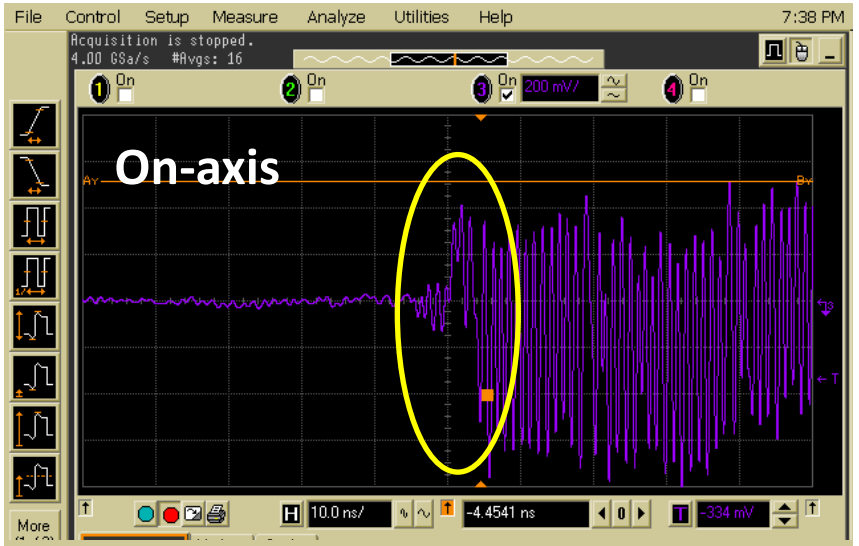


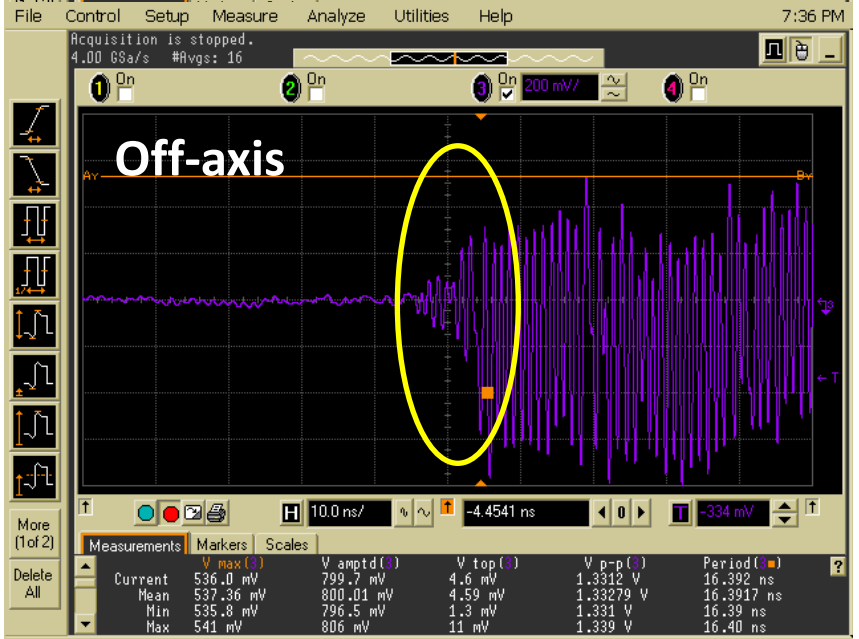
Example signals

PMT + Ce:YAG



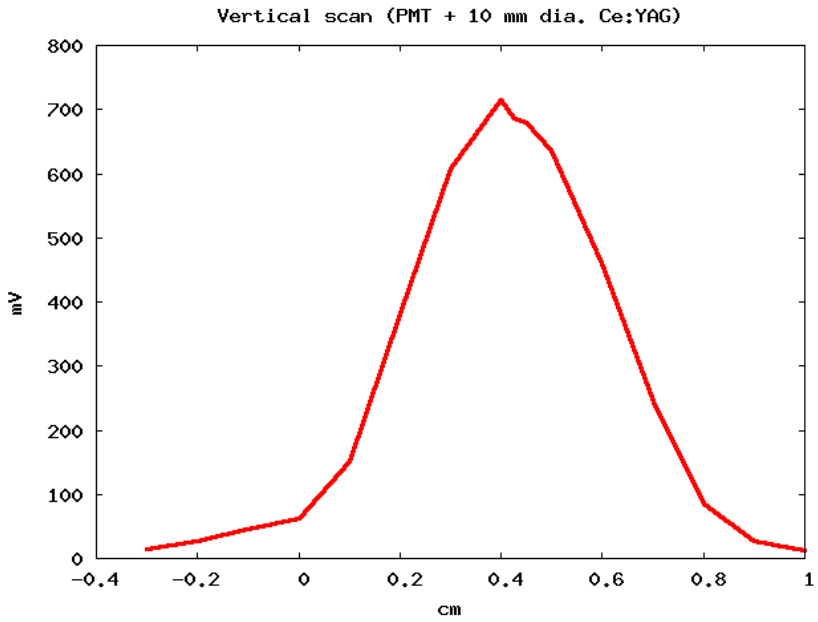
InGaAs





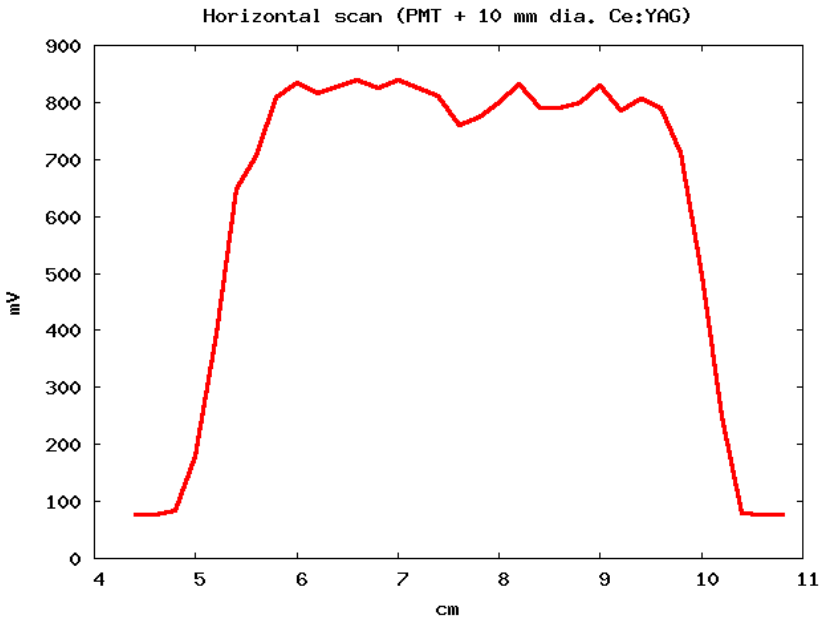
PMT scans
PMT + Ce:YAG (1 cm diameter)

Vertical scan



Vertical shift of 4 mm seen.

Horizontal scan



Horizontal width clipped: beam fills 5 cm of 8 cm window. Probably right edge (at 10 cm) corresponds to downstream window edge. Left edge due to upstream extraction window?

Summary

- V. shift of 4 mm seen
- H. shift of ~3 cm seen. Beam pipe needs to be shifted a bit closer to ATF2 beam line (closer to original axis).
- However, usable at the moment.
- Bigger problem is huge pick-up noise in InGaAs detector relative to signal.

- Note: Vacuum leak of ~60 Pa/day seen in beam pipe.
  - Leads to about 0.4% ATM after one week, which corresponds to about 3 cm of effective air pathlength.
  - Small compared to actual air gap of ~23 cm (21 upstream, 2 downstream)

- Plans this weekend:
  - Put CA mask in upstream holder
  - Re-pump down
  - Add amplifier stages to InGaAs det.?
- Longer-term plans:
  - Movers for beam pipe
  - He box around mask and detector to replace air gaps
  - Work on shielding for detector.
  - Automate read-out somehow…