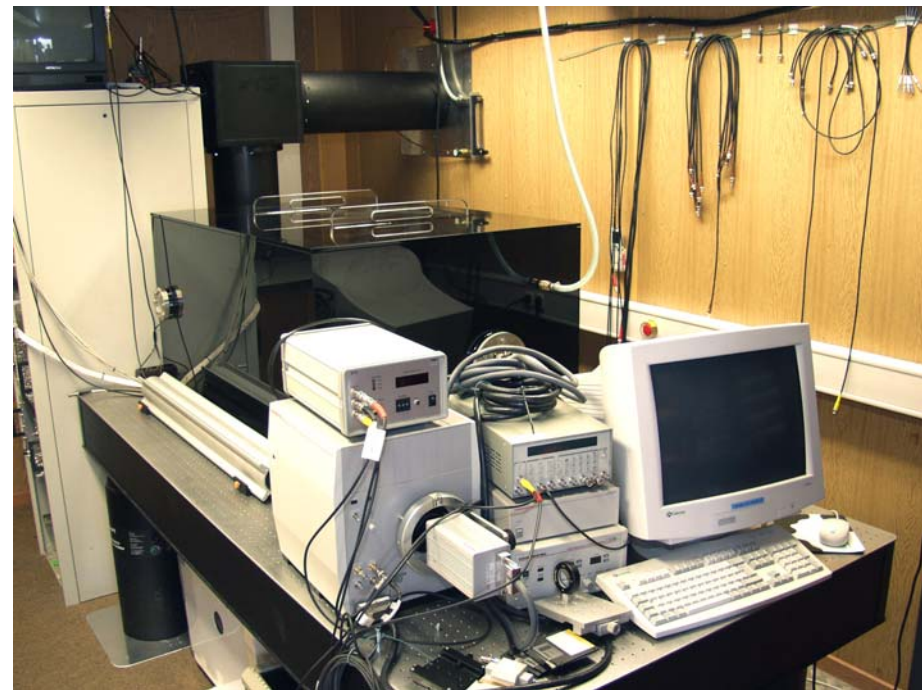
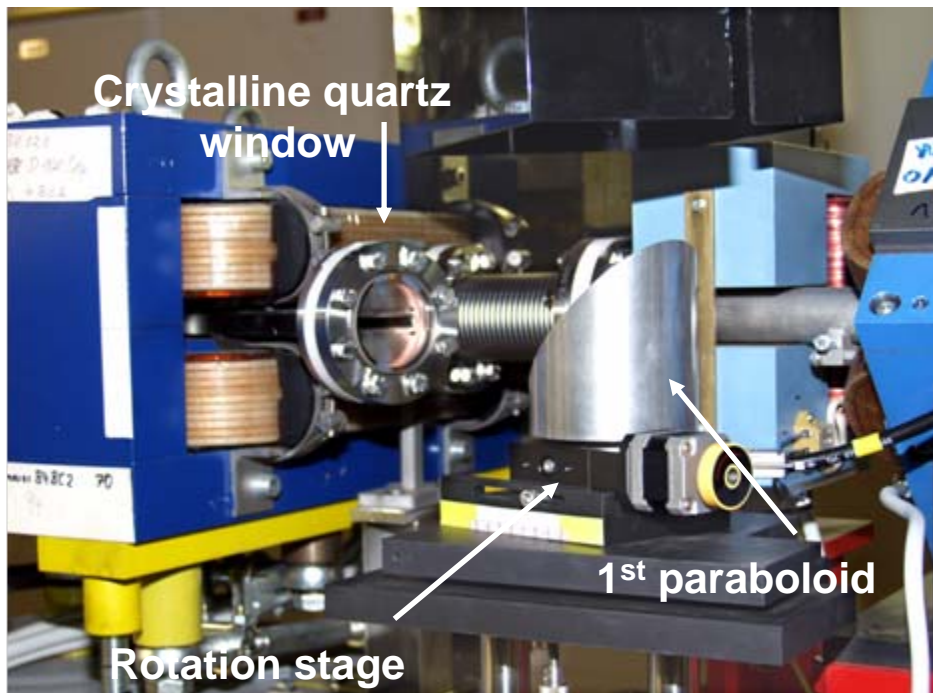


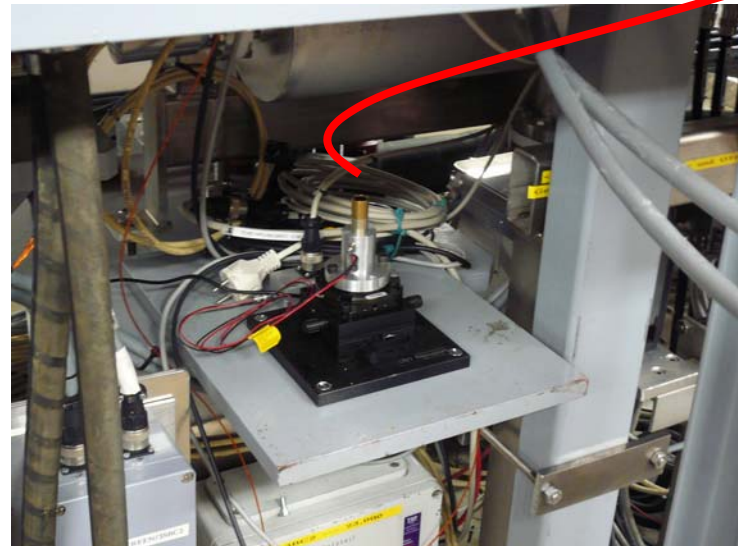
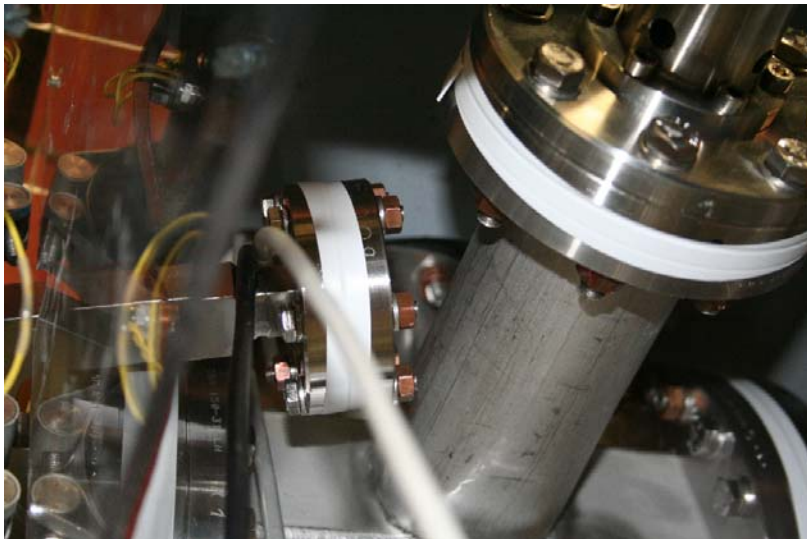
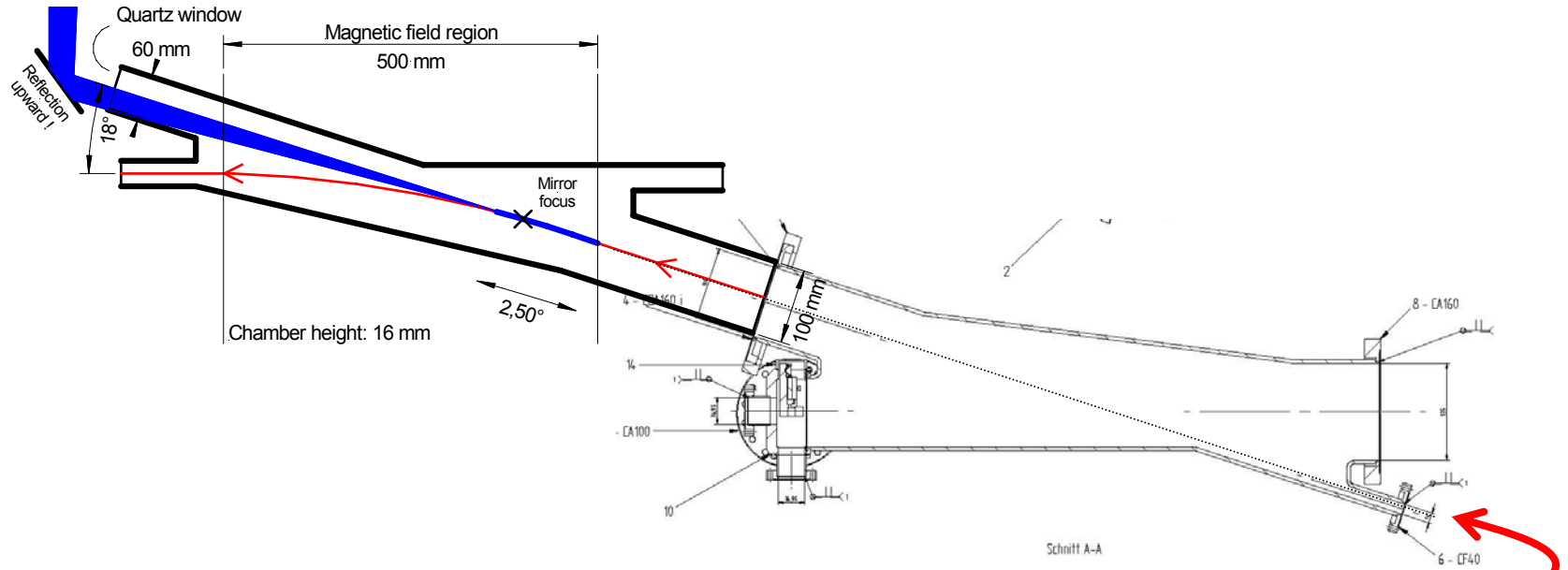
Synchrotron radiation studies in TOSYLAB

Work by summer student Alan Mak, September 2007

Oliver Grimm, 11 December 2007



Alignment laser port



Alignment laser work

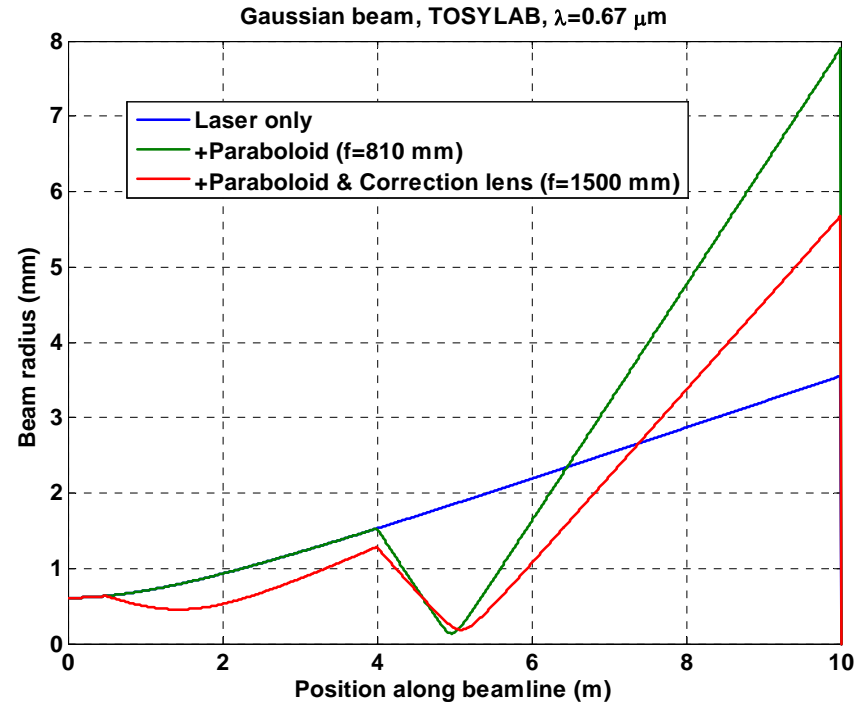
- Calculated and mounted lens for better focusing
- Measured response of laser steering

Original idea:

Measure axis of infrared radiation in TOSYLAB, then align laser to this axis

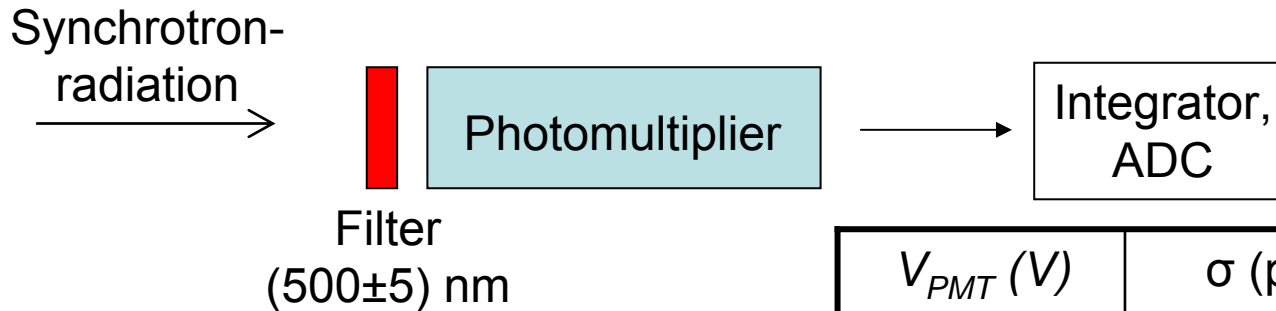
Problem:

Back-projected axis does not pass through laser port



Fluctuation analysis

Intention: Establish simple monitoring for *on-crest* bunch length



V_{PMT} (V)	σ (ps)
-1180	3.9 ±0.1
-1251	4.1 ±0.1
-1316	3.8 ±0.1

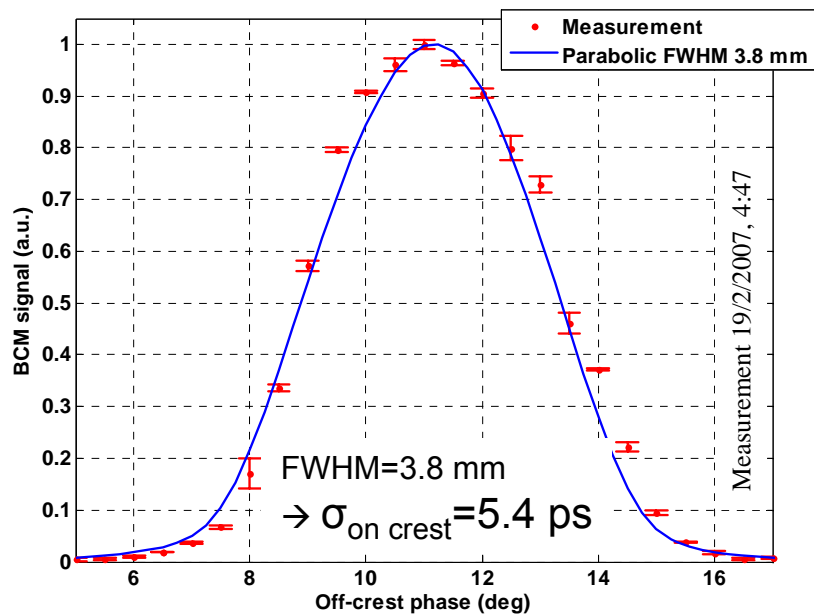
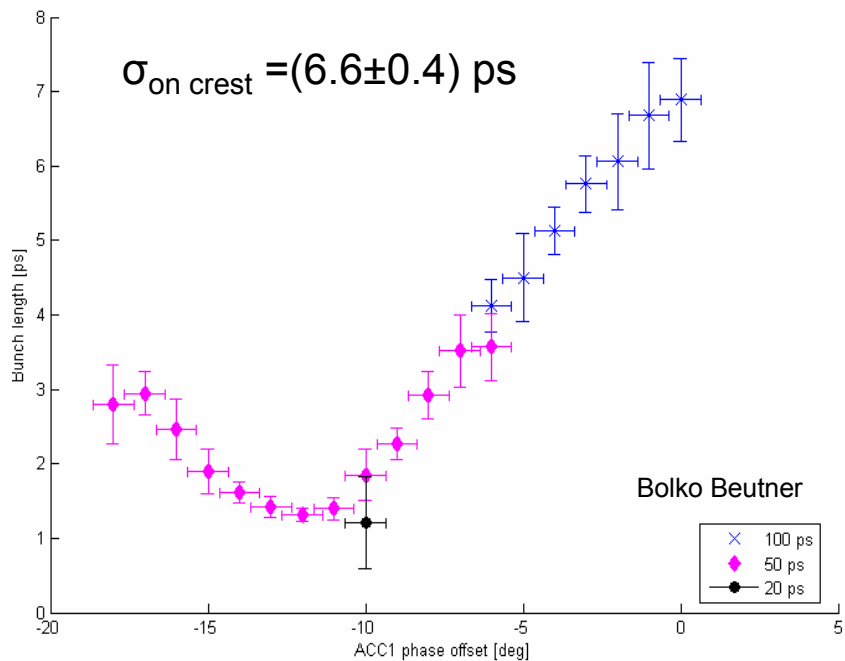
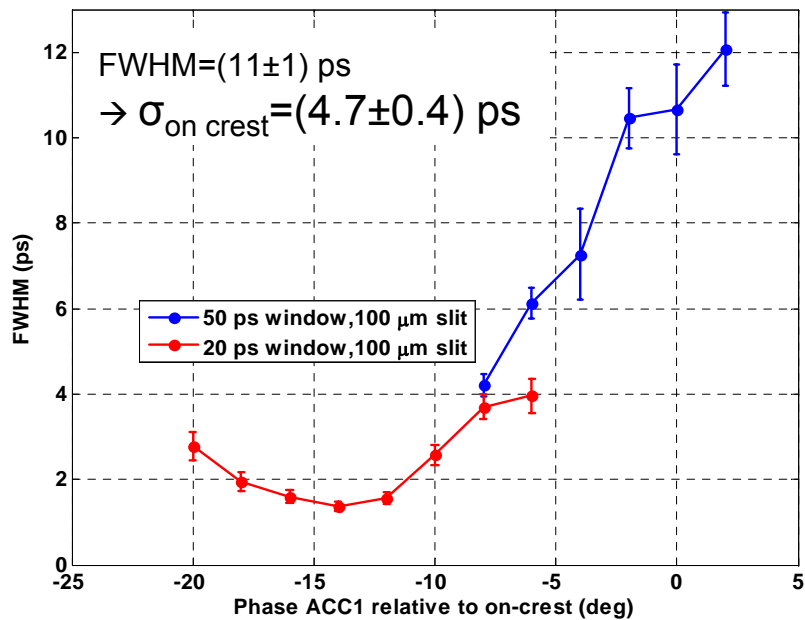
- Measure many shots
- Determined fluctuation
Correct for baseline noise, charge and HV fluctuations
($\sigma_G/G=9\sigma_U/U\approx 4\times 10^{-4}$)

Bunch length determination
(assumes full incoherence, Gaussian shape)

$$\sigma = \frac{1}{2\sigma_{\text{filter}}} \sqrt{\frac{\langle W \rangle^4}{\sigma_W^4} - 1}$$

$$\frac{\sigma_W}{\langle W \rangle} \approx 0.1\%$$

for this measurement



Next steps

- Check fluctuation analysis with different filters
- Maybe try APD as detector
- Compression scan with this method

- Martin-Puplett reinstalled, mount LHe cooled bolometer → uncompressed and dark current signals?

- Install second container to enlarge lab space