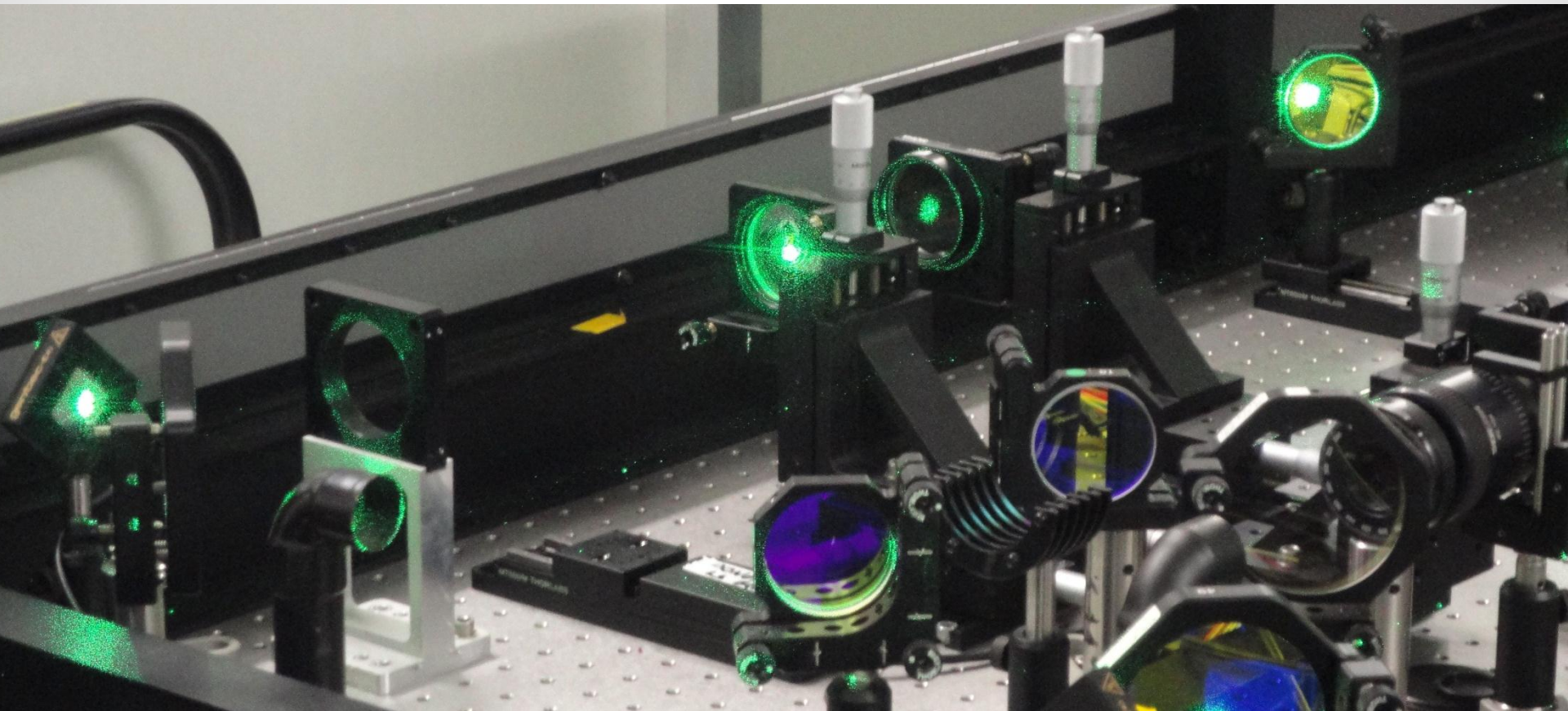


# Extraction Line Laser-wire



27<sup>th</sup> June 2012

L. Nevay



# Group

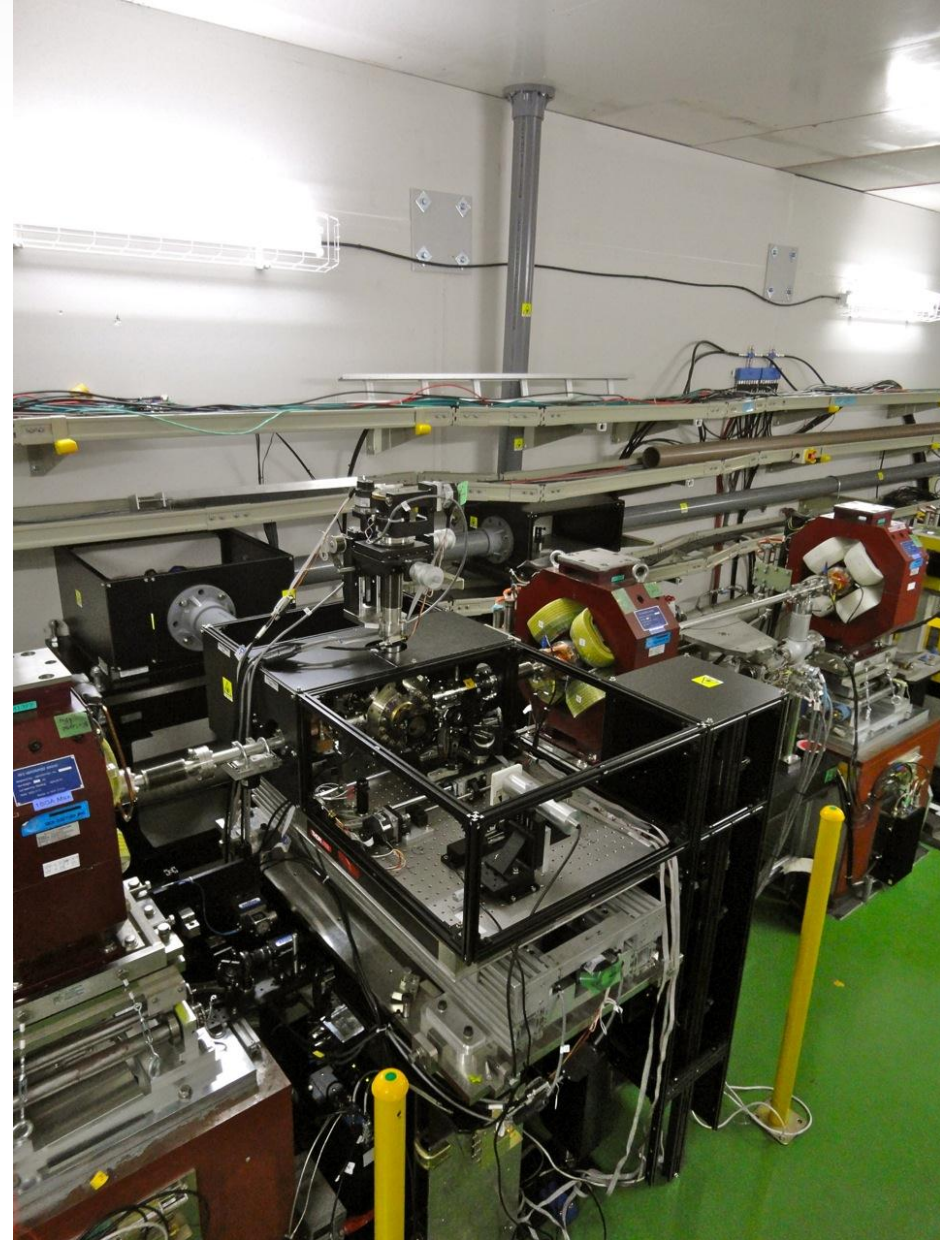


- L. Nevay, R. Walczak, L. Corner
- S. Boogert, G. Blair, P. Karataev
- A. Aryshev, N. Terunuma, J. Urakwa



# Laser-wire

- LW-IP in matching section
- Beside MFB2FF
- Virtual IP of ATF2 IP
- Aim to demonstrate  $1\mu\text{m}$  scans



# Previously...

- As of Dec 2011
- Laser-wire commissioned in new location
- Several shifts
- No collisions found between laser & e beam





# 2012 Operations

- April
  - Laser quality improved
  - Collisions found – achieved by overcoming timing difficulties
  - Timing investigation
  - Smallest scan  $\sim 5\mu\text{m}$
- May
  - Development of ATF2 optics for smaller size at LW-IP + Low background
  - $1.4\mu\text{m}$  V x  $230\mu\text{m}$  H e- beam (see OTR talk)
  - Data synchronicity issues discovered
  - Vacuum window damaged by laser
- June
  - Vacuum window repaired
  - LW recommissioned
  - Promising results!

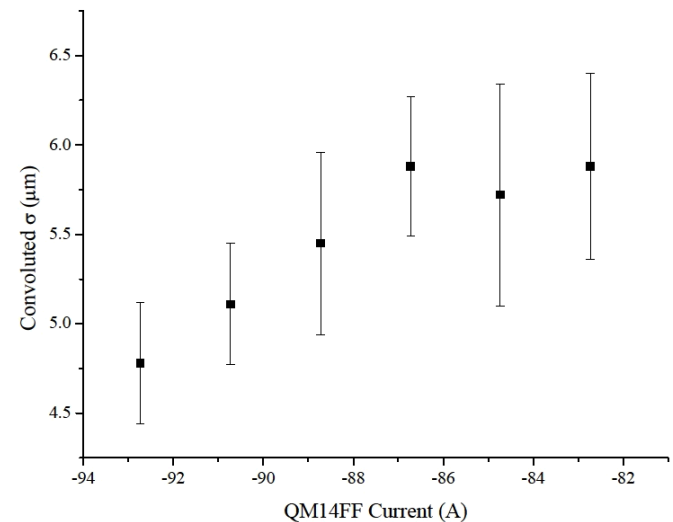
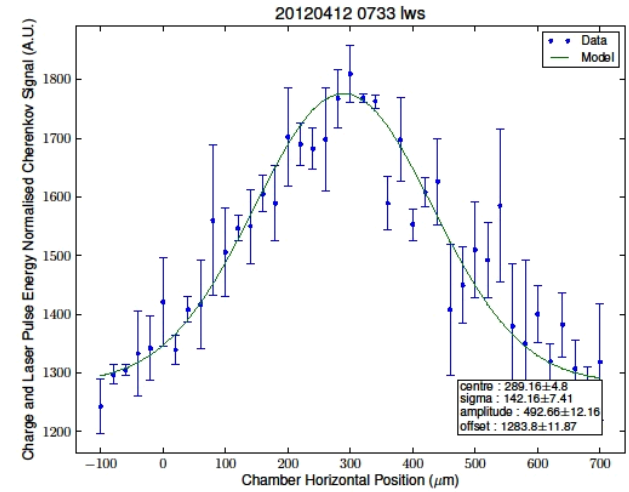
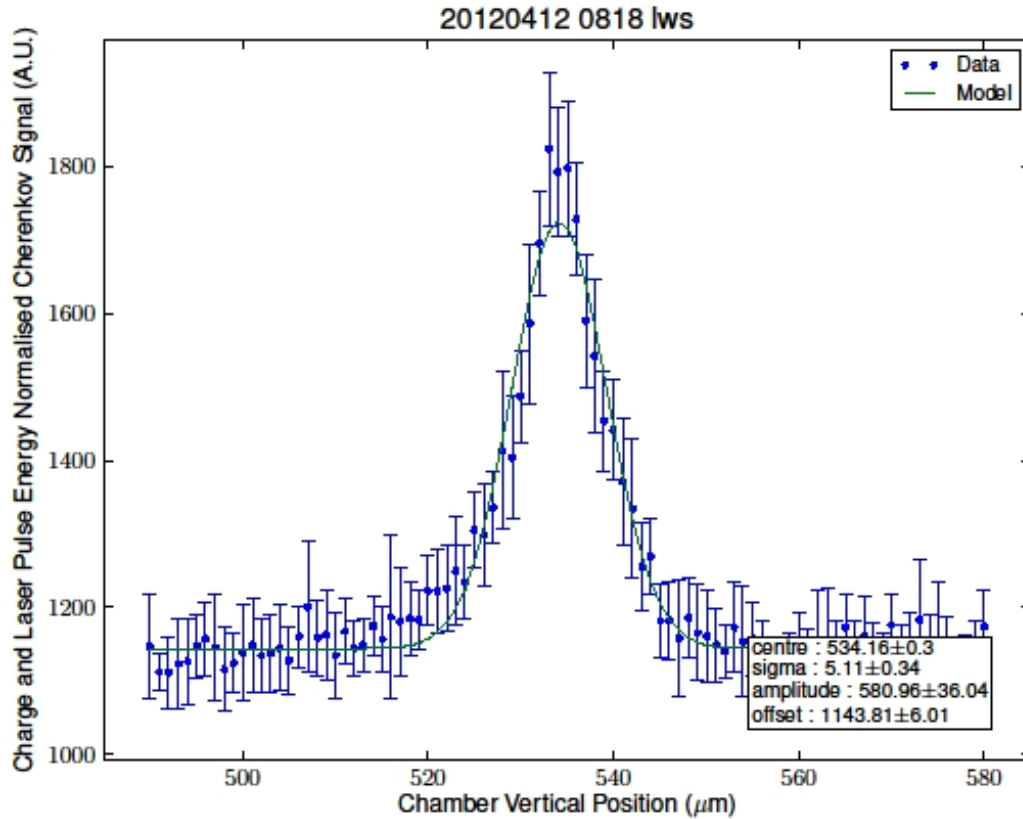


# ATF2 Optics

- Alex Aryshev & Pavel Karataev
- Nominal ATF2 optics can match to LW-IP
- Minimum IP size 70nm however...
- Background often large with ATF2 optics
  
- Custom LW optics
- Small vertical ( $\sim 1.4\mu\text{m}$ ) size & low background
- Reproducible from week to week
- Useable within 1 hr from loading

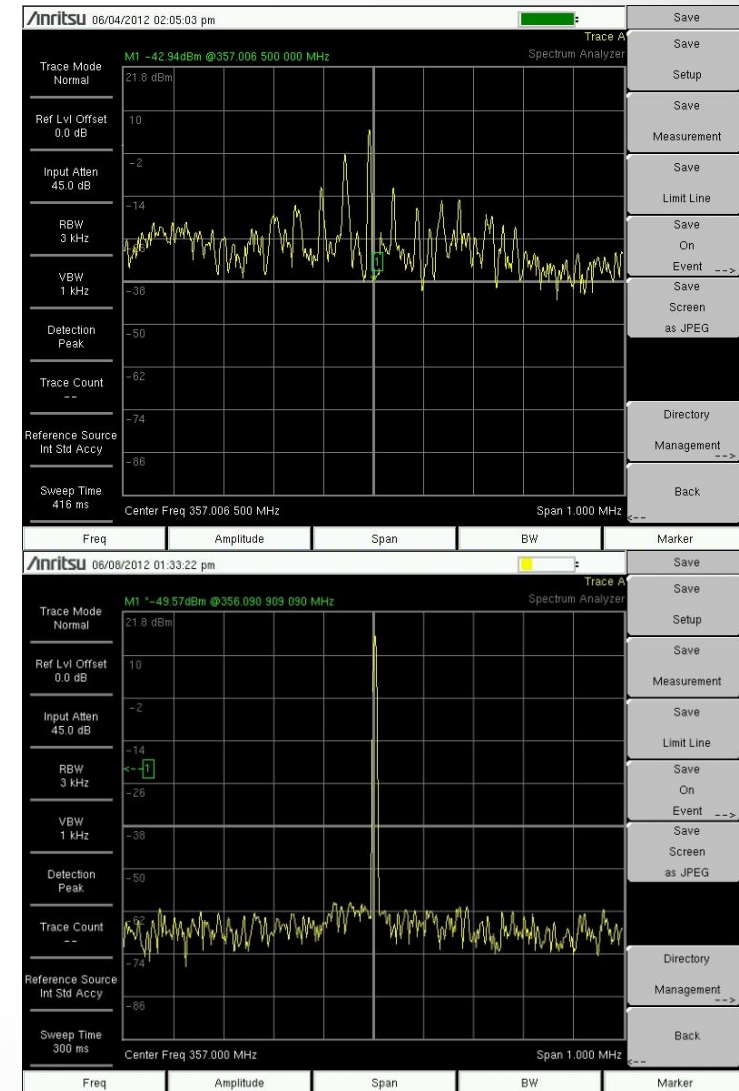


# Initial LW Results



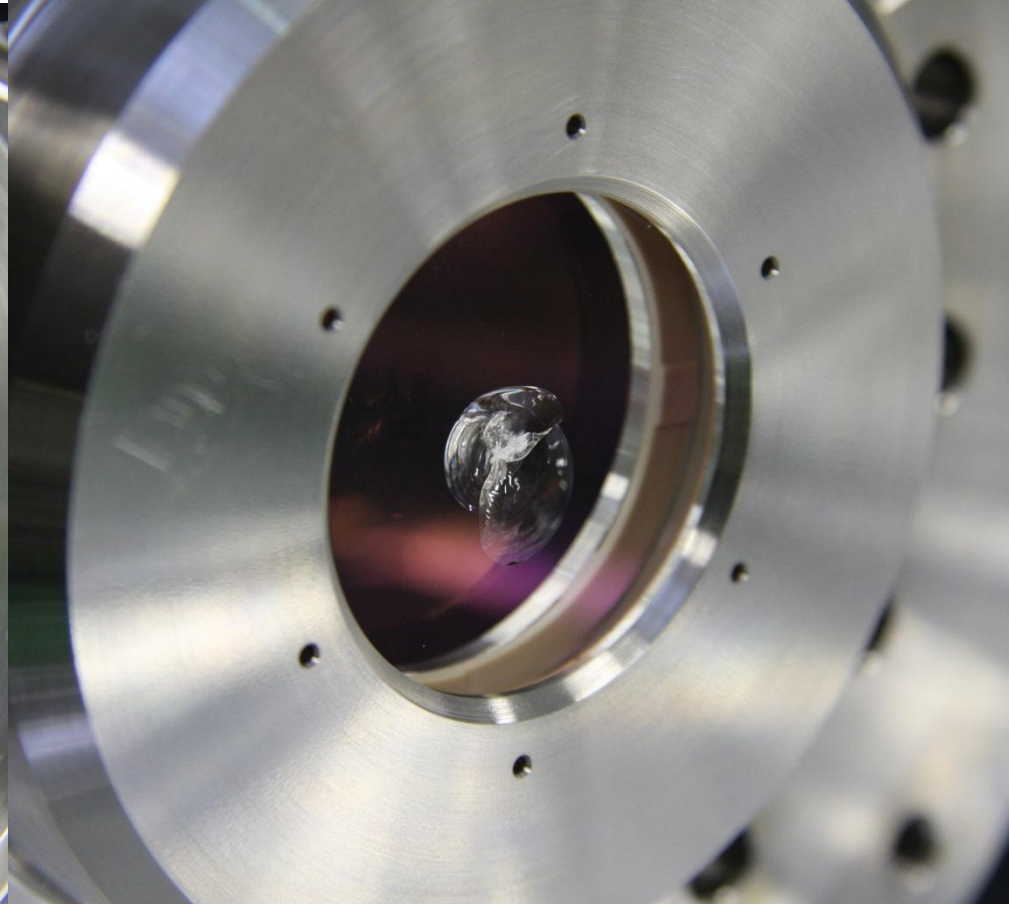
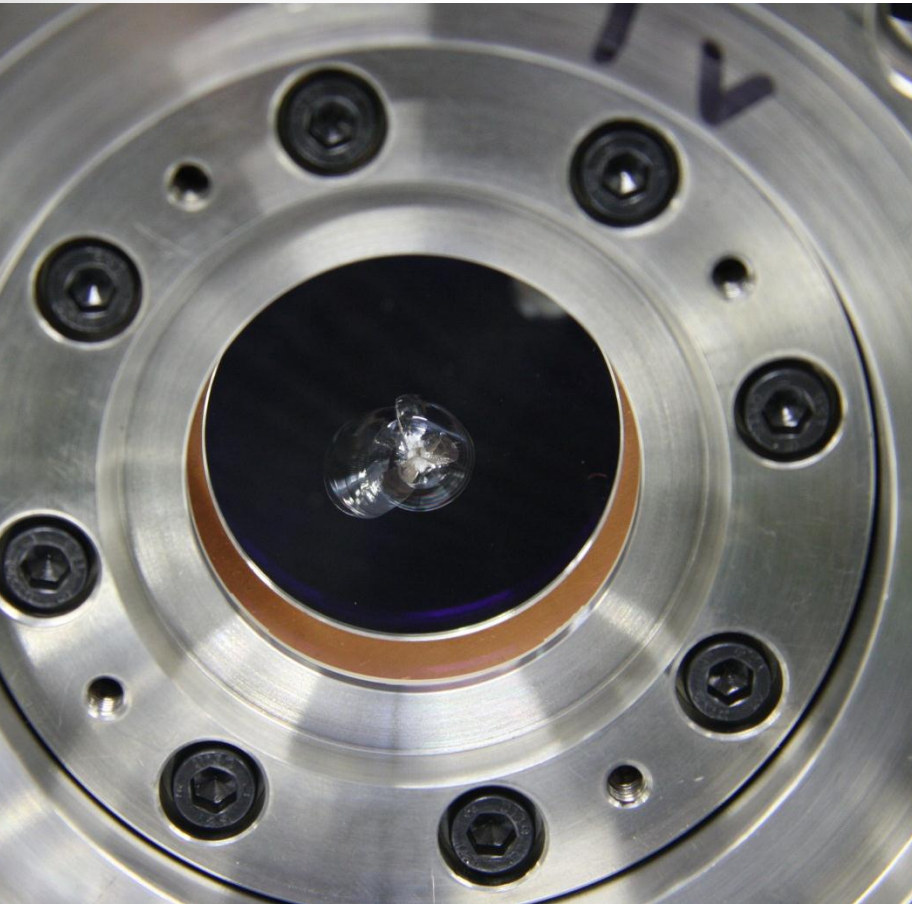
# Replacement Seed Laser

- Seed wouldn't lock
- Spectrum poor
- Output power low
- 1 Week spent trying to fix
- ATF2 donated old laser
- Stable lock now



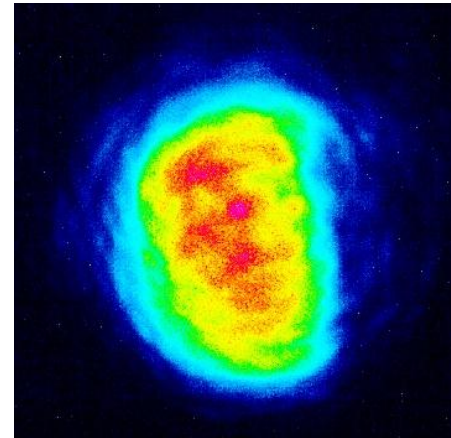
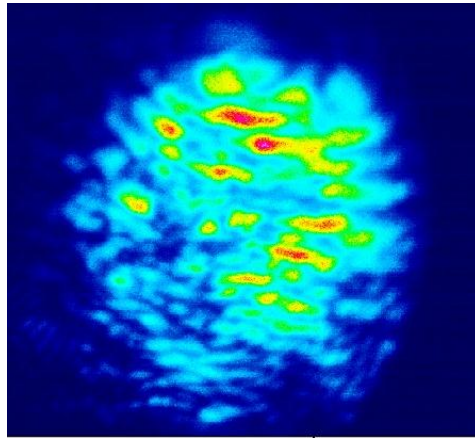


# Window Damage

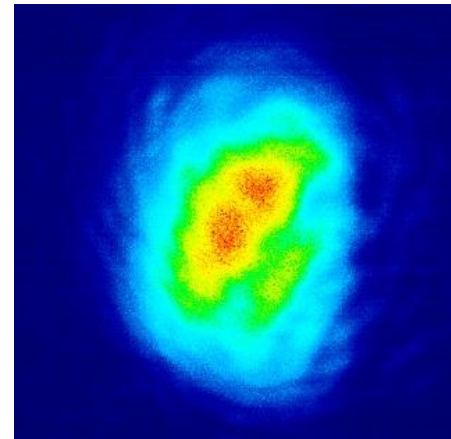
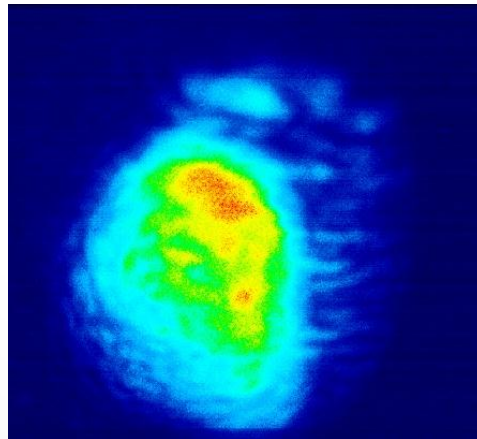


# Laser Tuning

Unseeded



Seeded



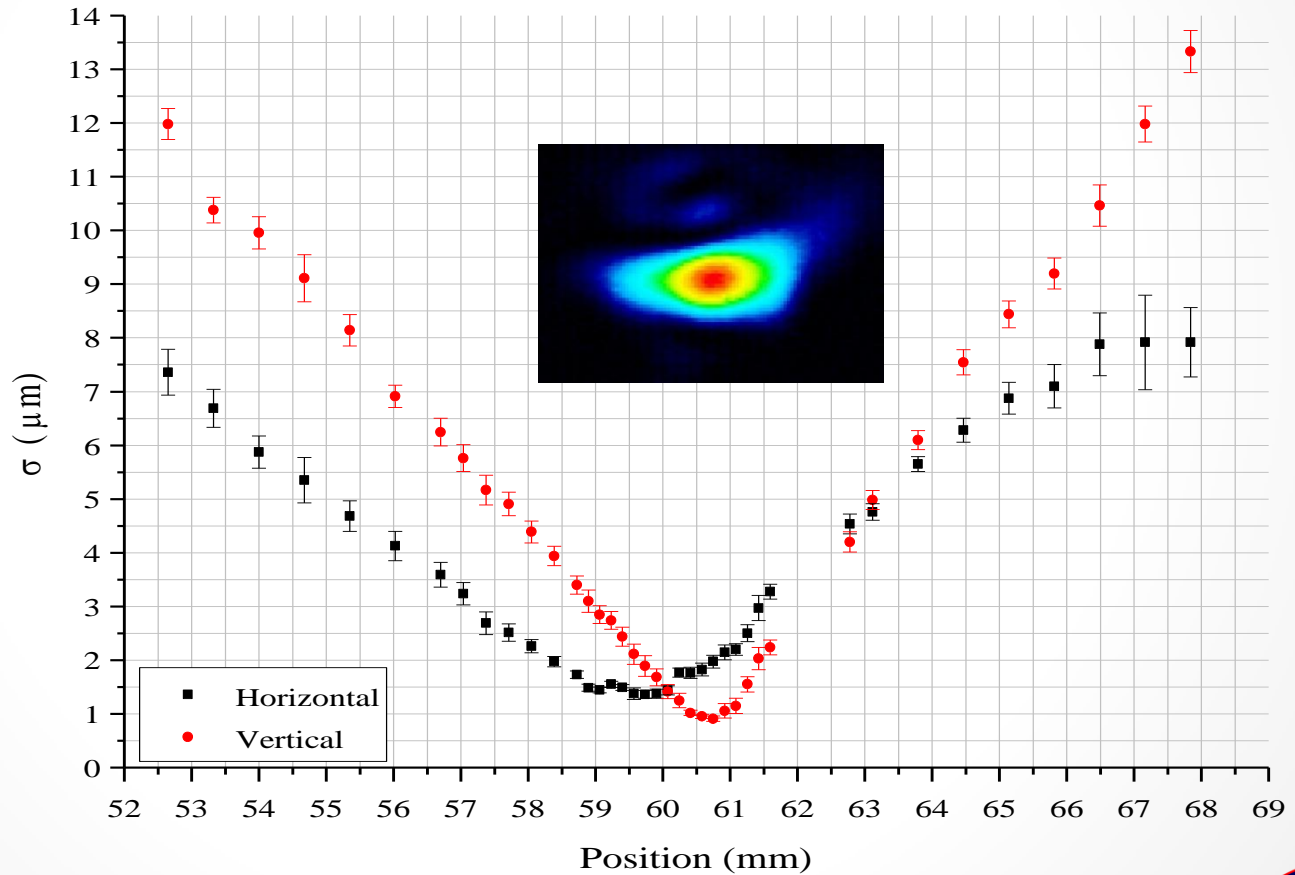
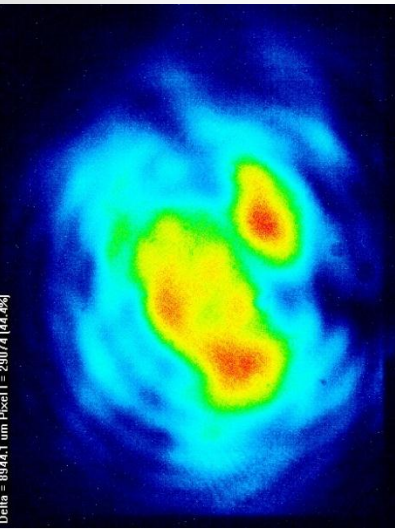
Before

After

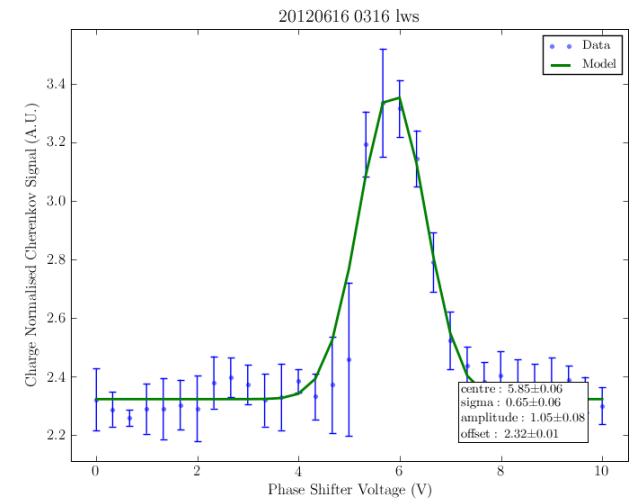
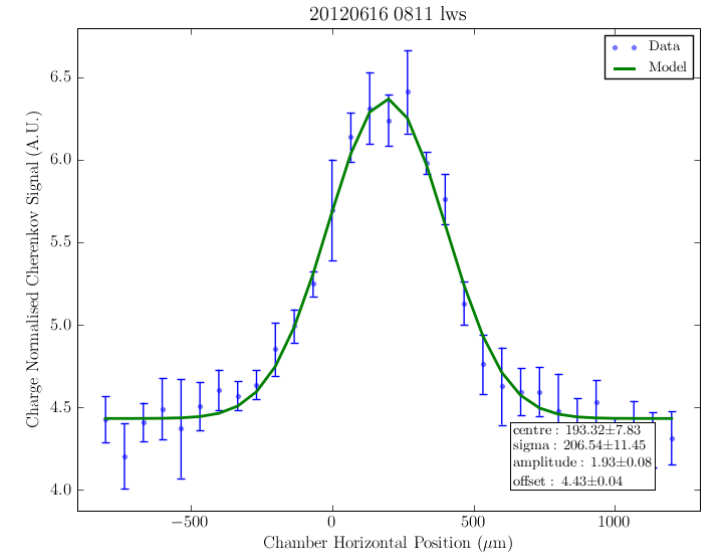
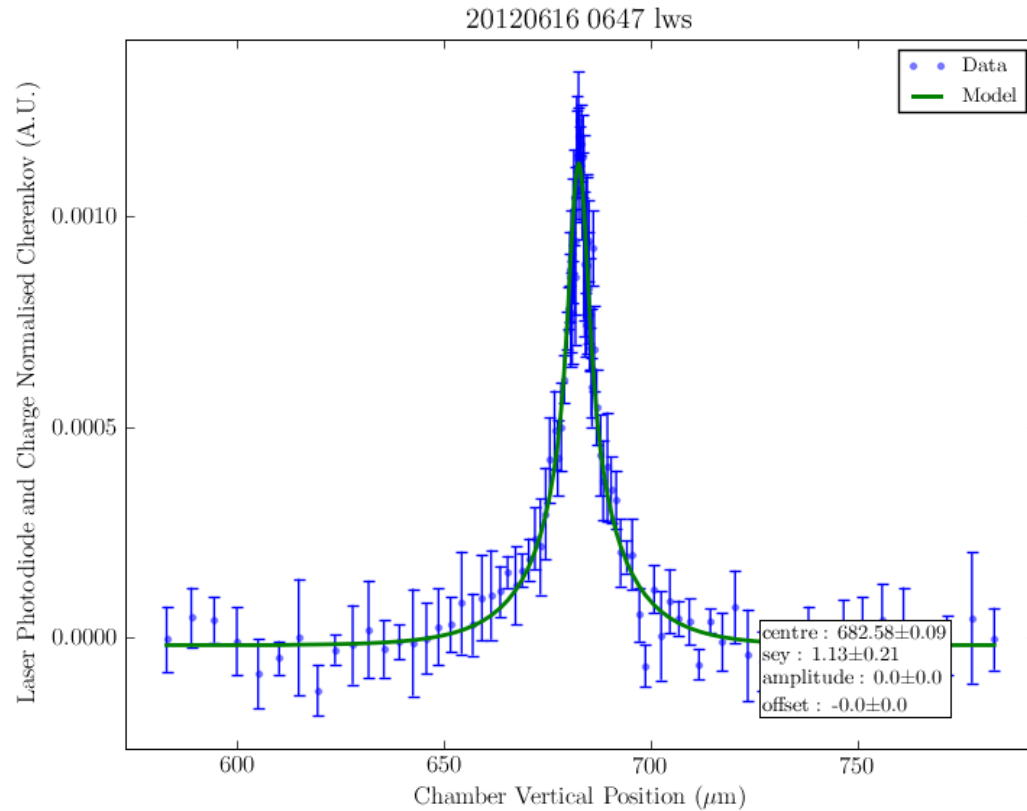


# Laser Propagation

-5° From Lab Vertical

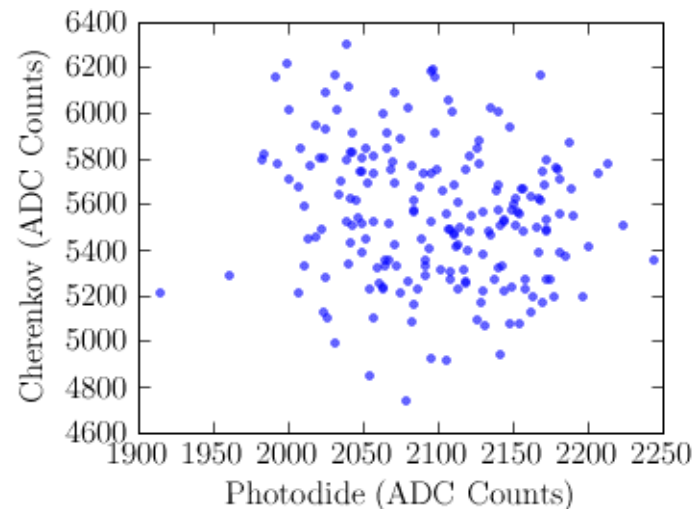
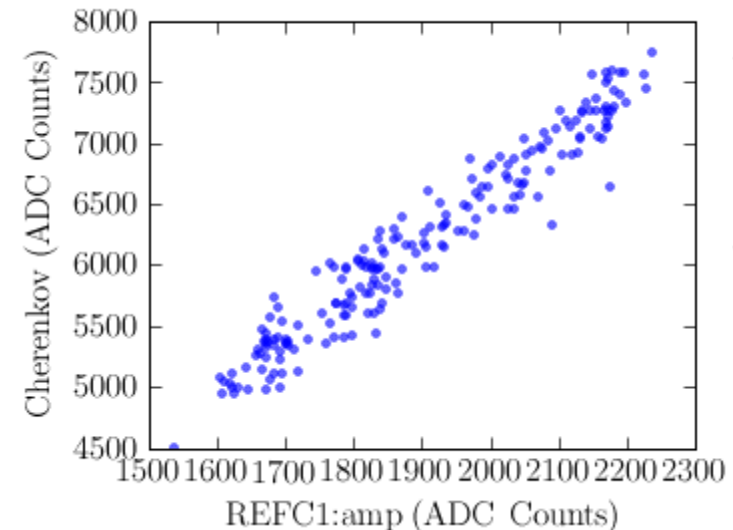


# Latest Results



# Correlations

- Charge correlation 0.98
- Laser correlation 0.37
- Commercial laser meter misses 30% of pulses due to firmware problem
- Self triggered unreliable
- Custom digitisation being implemented





# Data Recorded

- Vertical Slices at different horizontal locations
- Correlation logs
- Reproducibility scans at best location
- Quadrupole scan with vertical horizontal and vertical at each location
- Full analysis in progress

Many scans between 0.9 and 1.4 $\mu\text{m}$



# In Future

- Various hardware improvements
- Laser energy measurement fixed
- Fuller data set
- Software improvements for online analysis
  
- Work to improve usability of laser-wire by others

