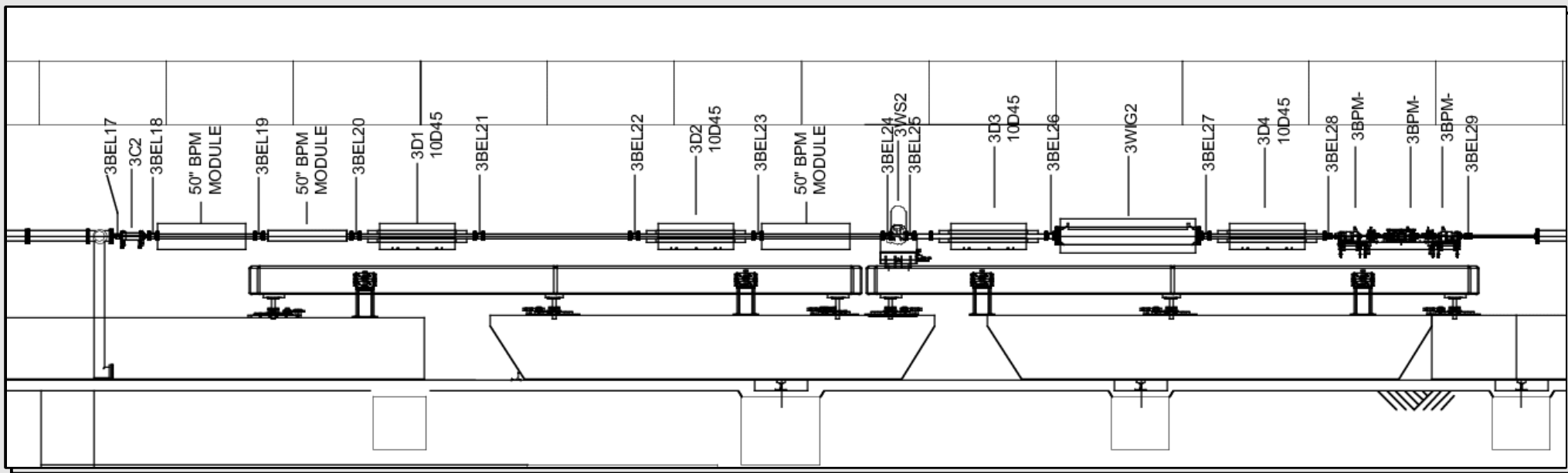# WP 4.2 review meeting

Status of the ESA work...

bino@hep.ucl.ac.uk

Introduction, Overview of the completed runs

January testrun :
- commissioning of BPMs 31,31 and 1,2 (41,42)
- readout, processing software etc...

April run :
- commissioning Chris' BPMs + x,y mover system on BPM4 + BPMs 9-11
- code optimisation, external/internal clocking

July run :
- commissioning of interferometer
- optimisation of hardware (new LO frequency)
- stability data taking interleaved with frequent calibrations

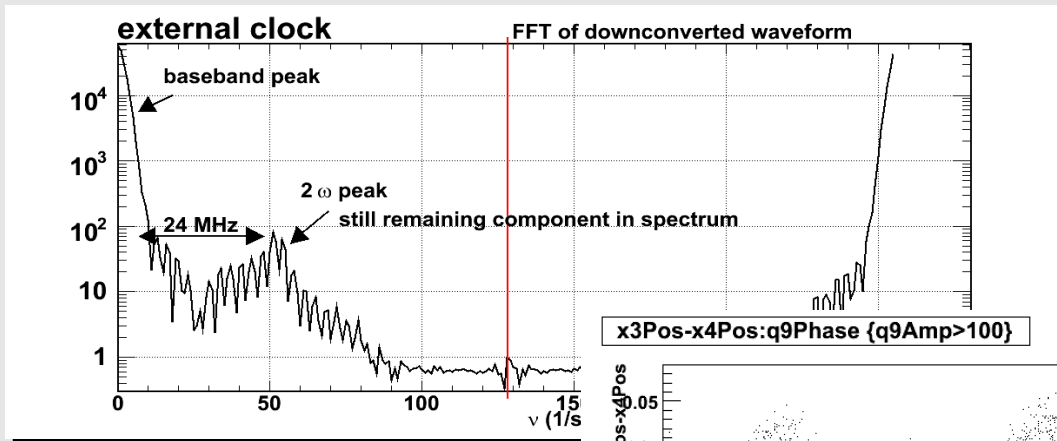# "The data" : improvements, optimisations

Spent much time digging in the code, determining optimal DDC constants for ext. (119 MHz) /int. (100MHz) clock to get good resolution !! (after april run)
Tune: **t0, t0Ref, filtBW, Gamma, Omega** for each BPM
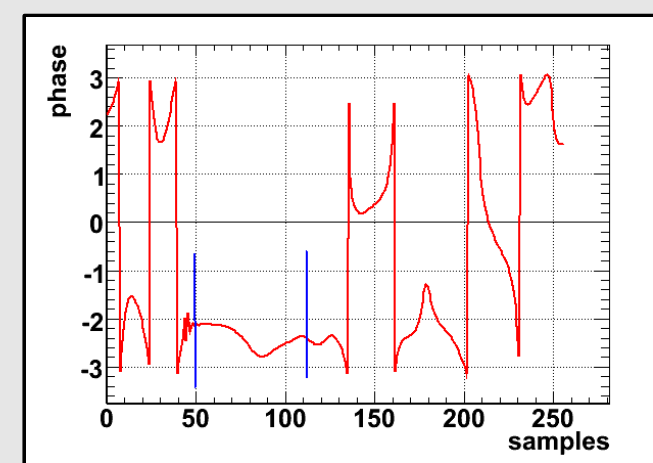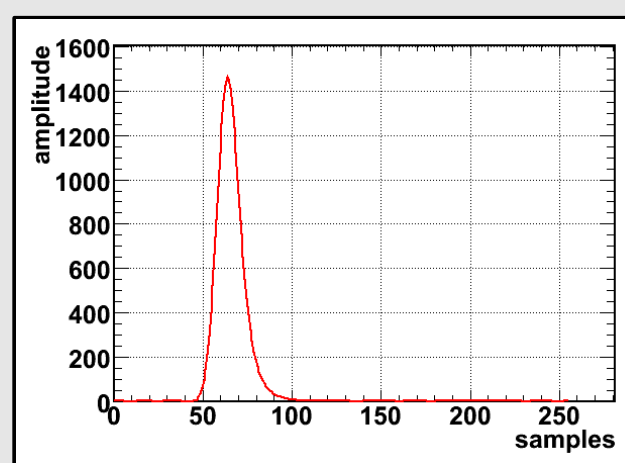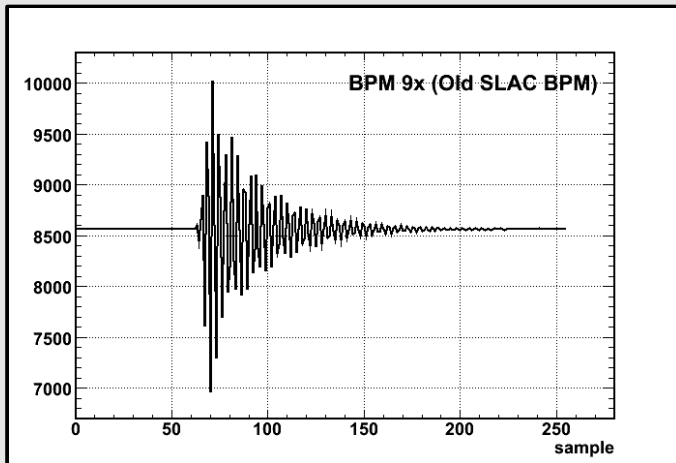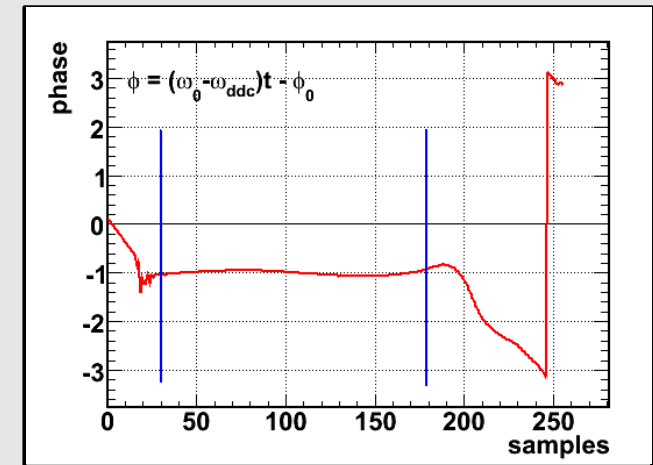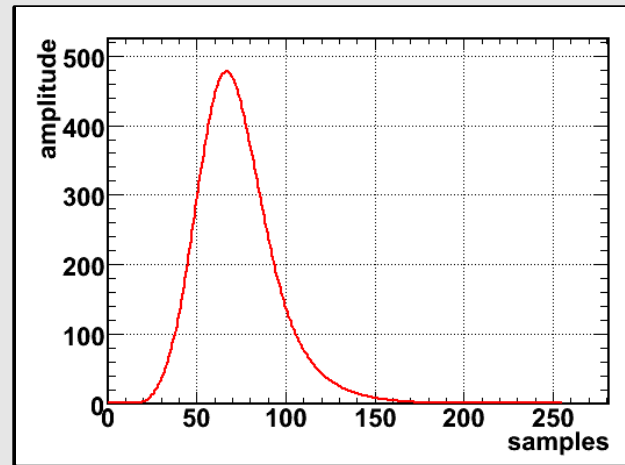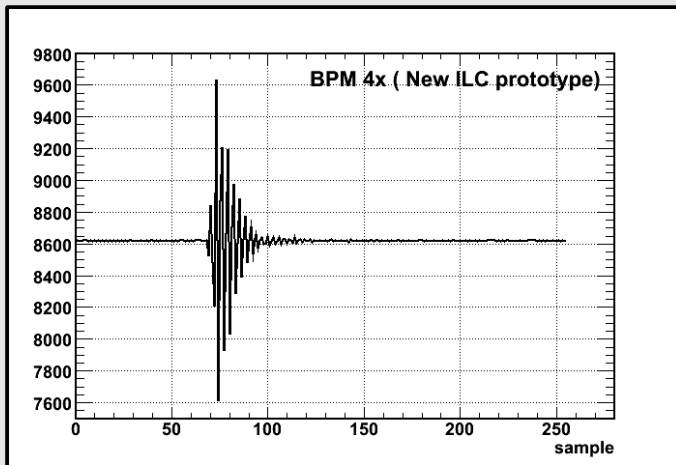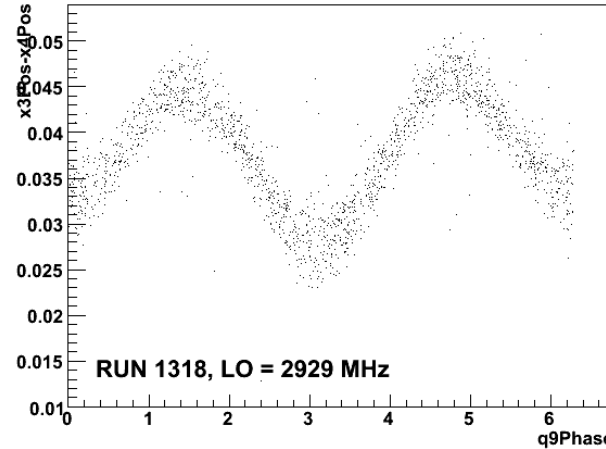

Roughly go from 50 micon resolution to around 5 micron

"The data" : improvements, optimisations

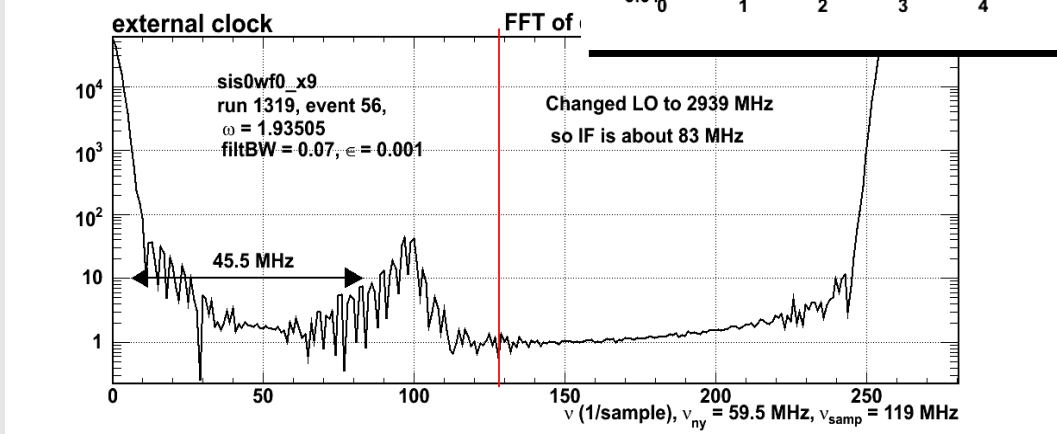During july run :
change in LO frequency
(now mix down to -83 MHz)
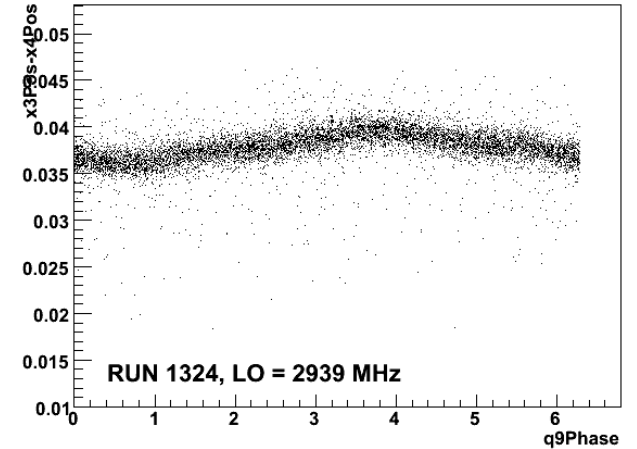
Phase dependence of resolution
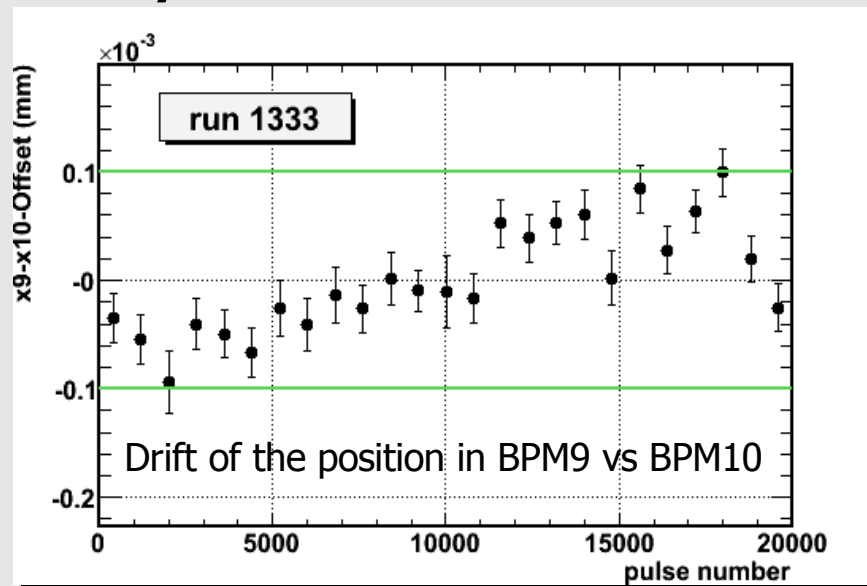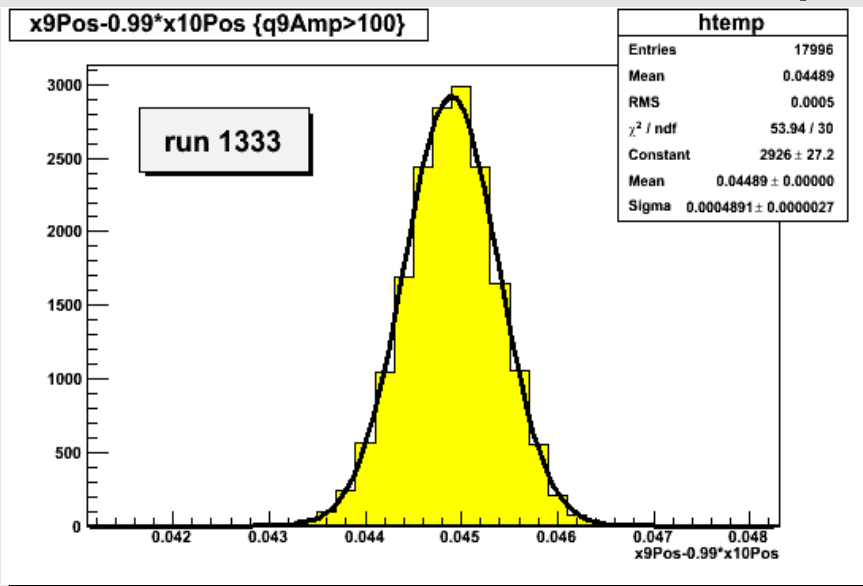
Down down < 1 micron resolution

"The Data" : resolution, stability so far

Resolution 'out of the box' : BPM 3-5: ~ 700 nm in x, BPM 9-11: ~350 nm in x

20k pulses ~ 30 min
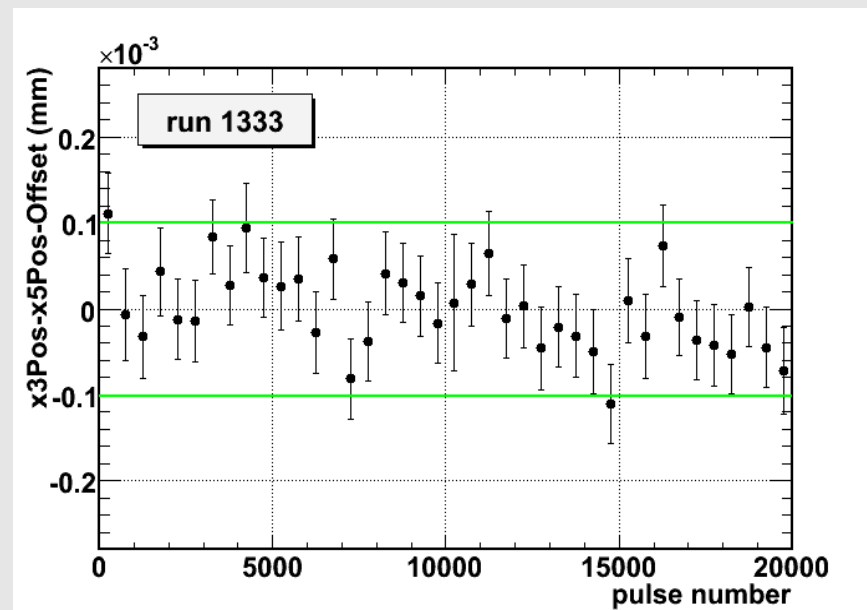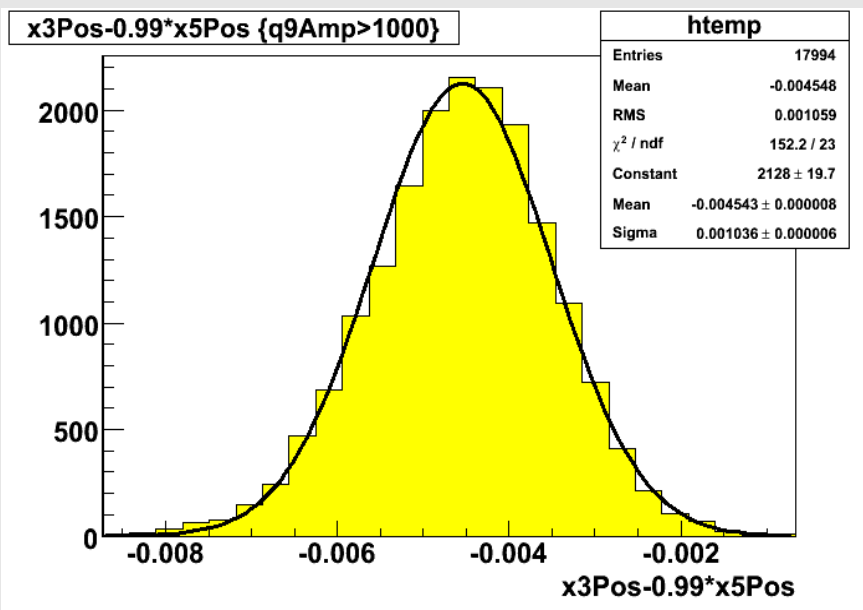
Further improvements to algorithm/ROOT files

Need to
➢ Include timing information for the runs (maybe pulse time stamp or something) now : external run list with UNIX times for start of run
  Implement a second filter to get completely rid of 2 omega component, but need to check whether DDC handles this correctly + need to optimise filter bandwidth for that + recalibrate data

At some point in future... base processing on our own libespec

• Better filter ?
• Direct interface with labVIEW online processing etc...
• We know the code :)
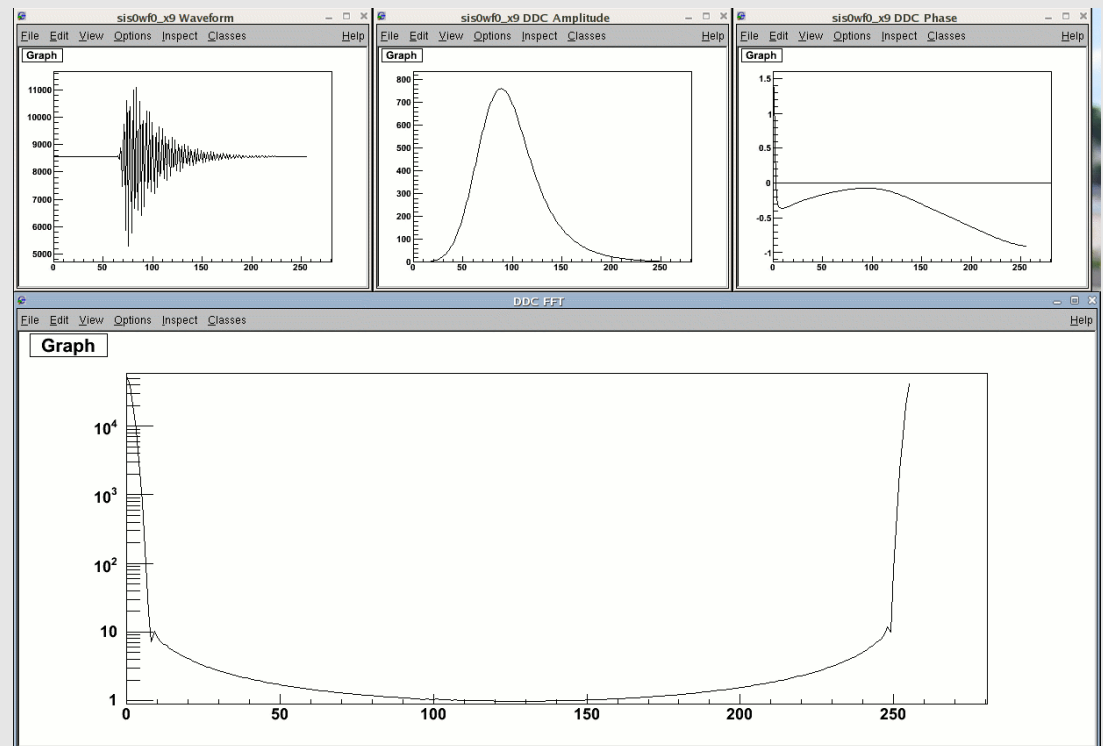
Calibrations

Corrector scans / setpoint calibration... lot of manual work needed

$\downarrow$

BPMCALI macro

- ➢ automatic execution with delay between n cycles of corrector scan with feedback + mover scan on BPM4
- ➢ set voltage level for each step in ADC
- ➢ still need to implement automatic processing
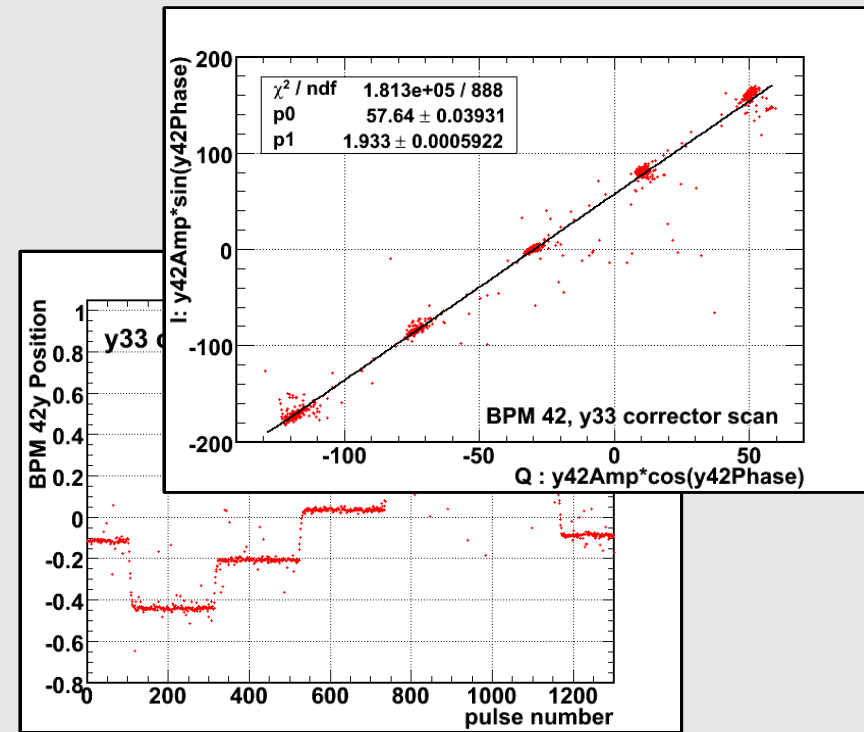
Calibrations, stability

- IQ phase and scale stability for July run
- e.g. BPM9-11 (>1460)
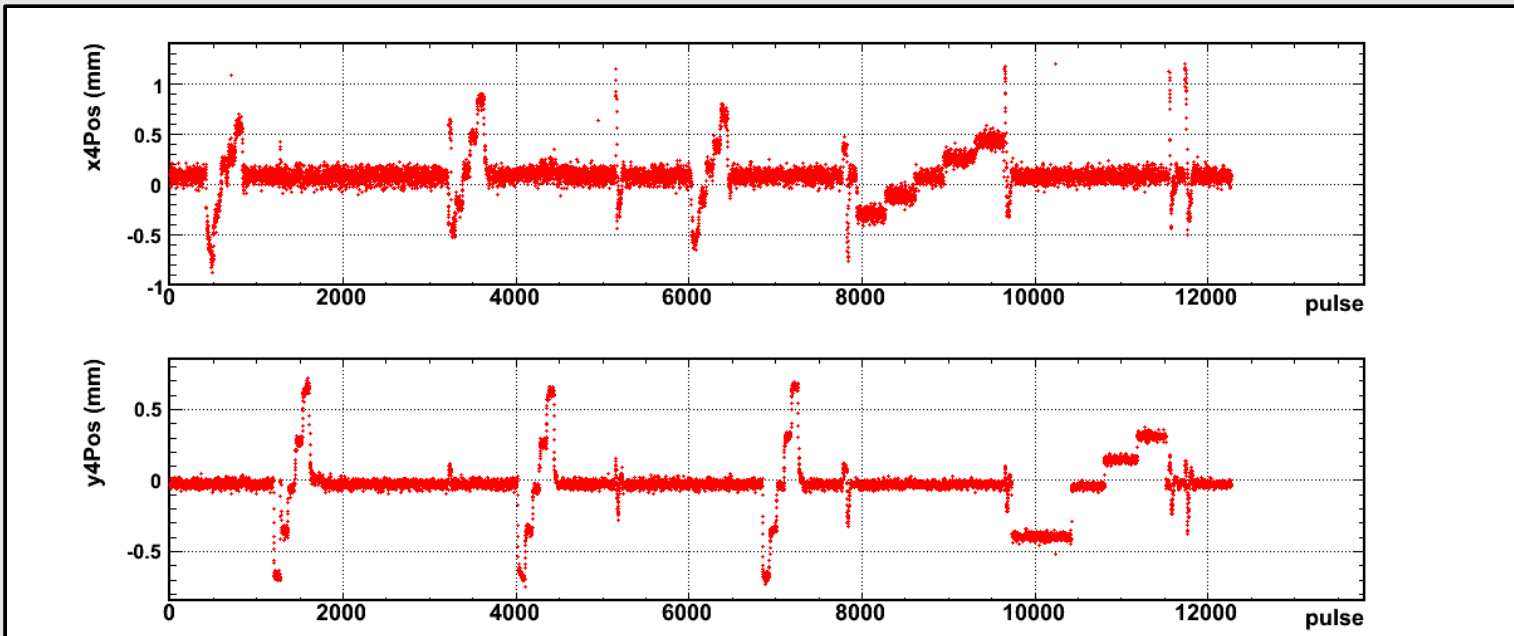- BPMCALI, scales and IQ phases stable to within a couple of %

However **need to understand the different systematics** involved

-> strong case for planned calibtone
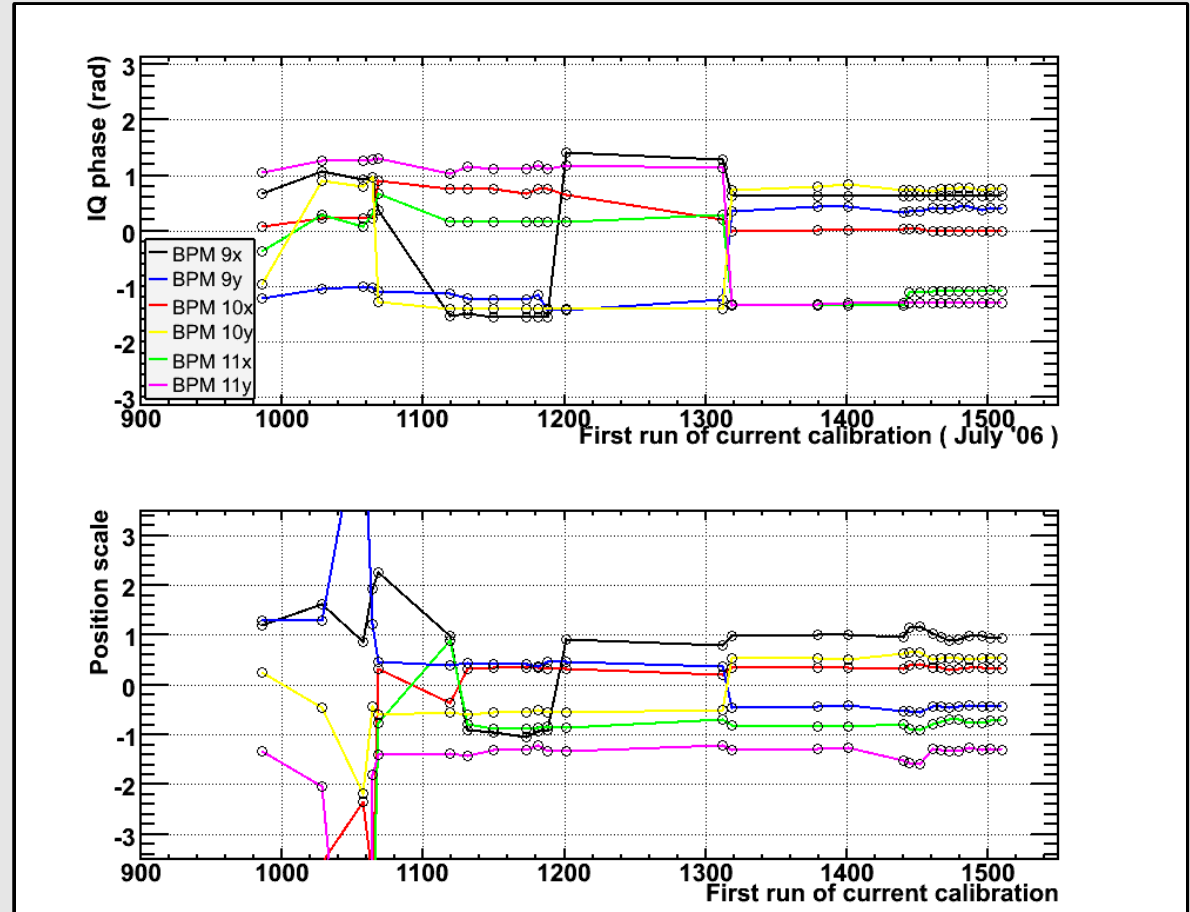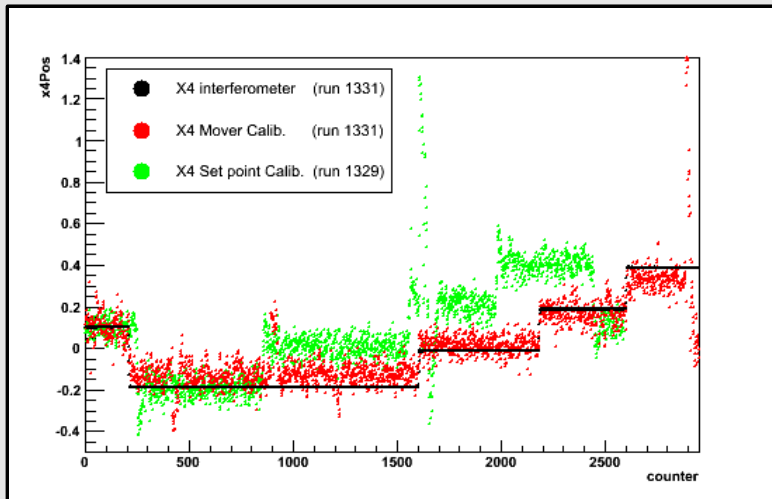
Cross check with mover calibration + interferometer
--> think + implement a scheme which **corrects automatically the scales using movers + zygo** when processing the BPMCALI macro
--> check **accuracy of BPMCALI** against mover calib

Interferometer, Geophone measurements
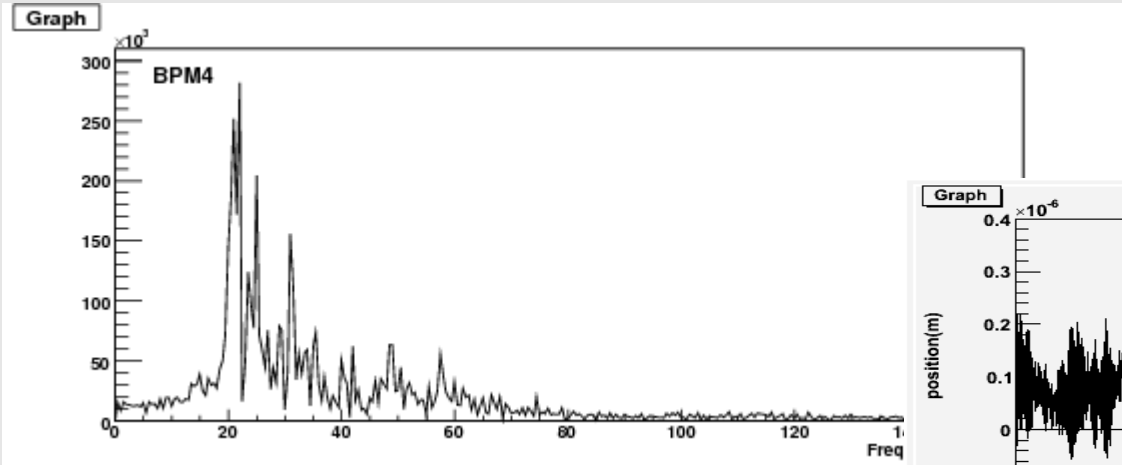
Data from interferometer on BPM3-5
- BPM3 and BPM5 show similar behaviour
- BPM4 (on mover frame) different
- frame prob acts as amplifier for ground vibration
- Girders show 20Hz vibration...

Can we damp this vibration ?
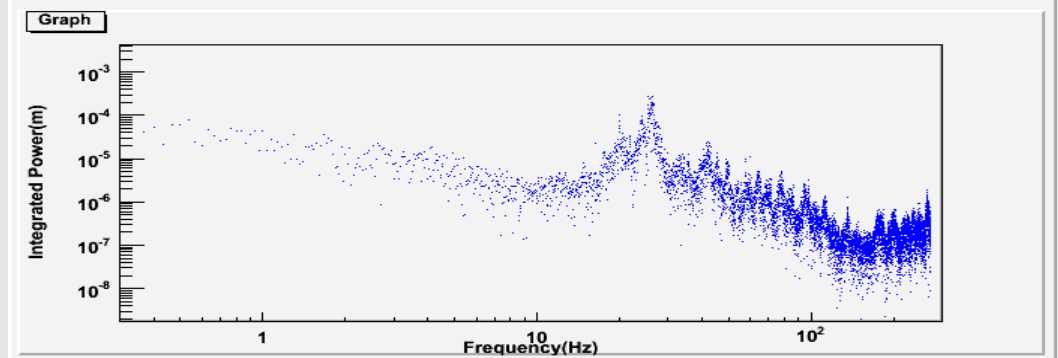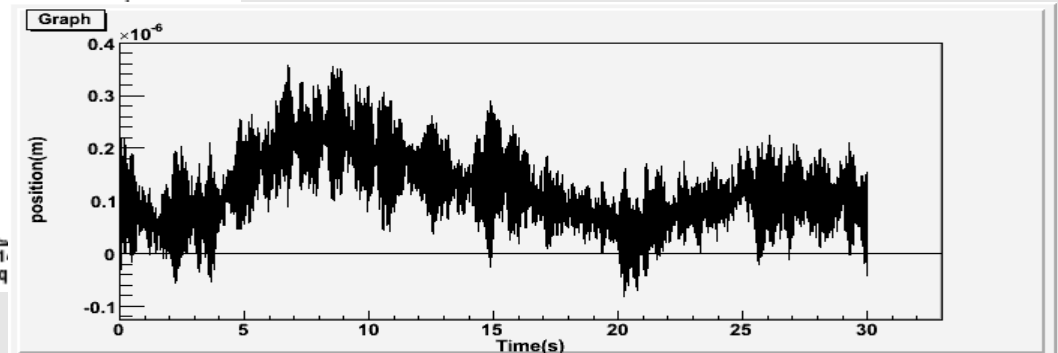
Geophone measurements on Girder (Mahsa)

For BPM3-5 in first order we prob. care less then for new BPM frame. Might be worth is to do FEA on the new support (after figuring out how to do this obviously ;-))

Magnet mapping/installation in ESA

- As Ray mentioned: use 10D37 magnets
- Mike tells me that concrete plans should crystalize within 2-3 weeks for mapping B(x,y,z) and B.dl(x,y)

- Ray has started designing Al stands for magnet
- Mike has had some discussion with Juergen/Dubna
- We need to figure out with Ray what to measure in workshop / in situ
- Need concrete plans on distributions of NMR/Hall/Flux Gate magnetometers
- Control, feedback etc... need work on that !
- Simulations by N. Morozov (Dubna) :

- Required Bdl of 0.118 Tm, current needed for that 146 A
- Effective length 106.8 m
- Expected Bdl uniformity 10^{-4} in +/- 15mm
- Studies on fringe field contributions
- Defined region for possible NMR probes
- Temperature factor for field integral 6.1 10^{-5} / C
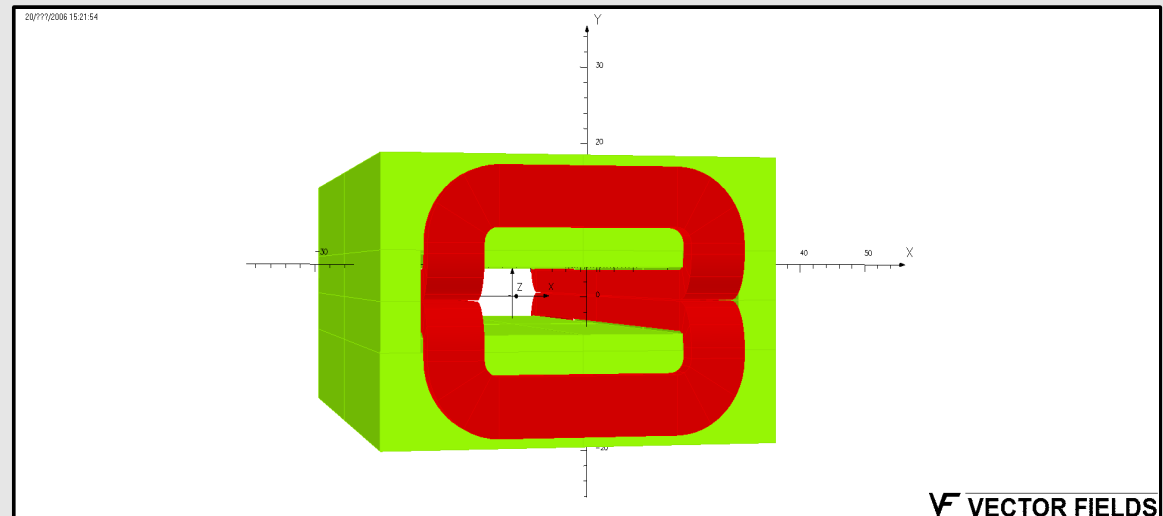
Next ESA run issues

- Need people at SLAC for big part of January to prepare
  - Installing our BPM, readout, temperature, movers etc...
  - Calibration tone electronics...
  - Setup processing before the run so can be done more efficient
- Might make sense to have someone there for a couple of weeks before end of the year to facilitate communication (maybe help with magnets), and smooth the way for January
- Interferometer, link stations using an invar "ruler" as base with interferometer heads at the endpoints. Mike H. is working/thinking about that...
- Plans to move BPM4 to middle of the chicane.....
  - Mike would contact Chris. A on this point
  - Need to carefully think/discuss about that
    - Mover range of system (2"... so prob fine)
    - Design support frame ? Integrate with our own support ???
- Preliminary 2007 run dates :
  - Run 3 : Jan 30 – Feb 12
  - T-LCLS : July 5 – July 8
  - Run 4 : July 9 – July 22

SLAC Funding
ESA as an ILC facility in the future
Collaboration with DESY/Dubna

- Funding for 2007 (FY07) looks good, we will have runs in Jan and Jul 2007.
- Funding for 2008 (FY08) doesn't look so good....
  - Proposal submitted to bring LCLS beam to ESA (T-LCLS, Mike)
  - need to come up with "ammunition" for Mike to push for funding
  - targeted NIM paper should be completed by the end of the year !!!

- Thought that crossed my mind... how to we see collaboration in future with DESY/Dubna ? Take some more initiative ourselves there ???