MONALISA

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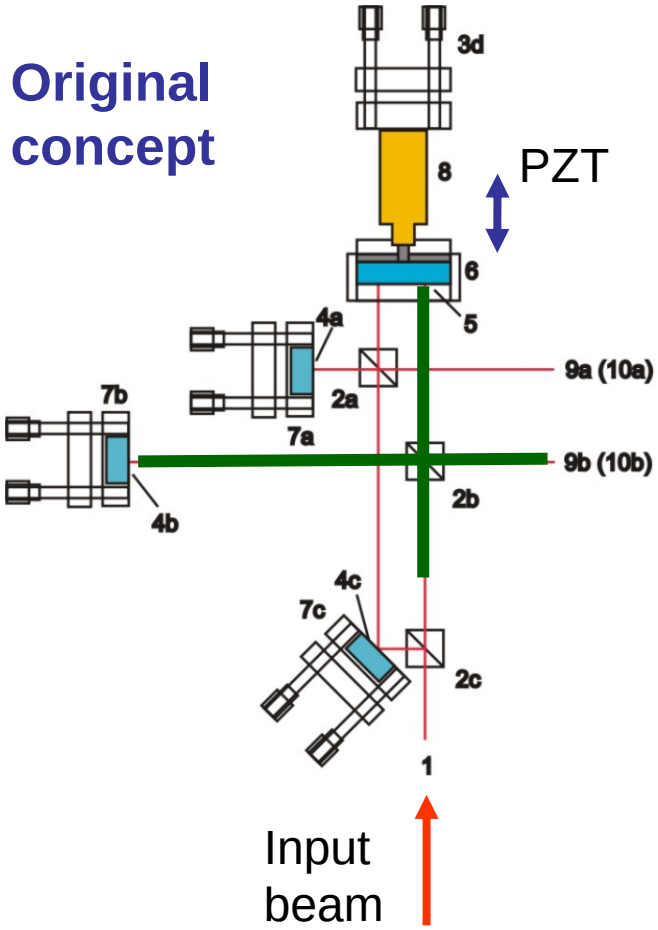
STATUS: New Design

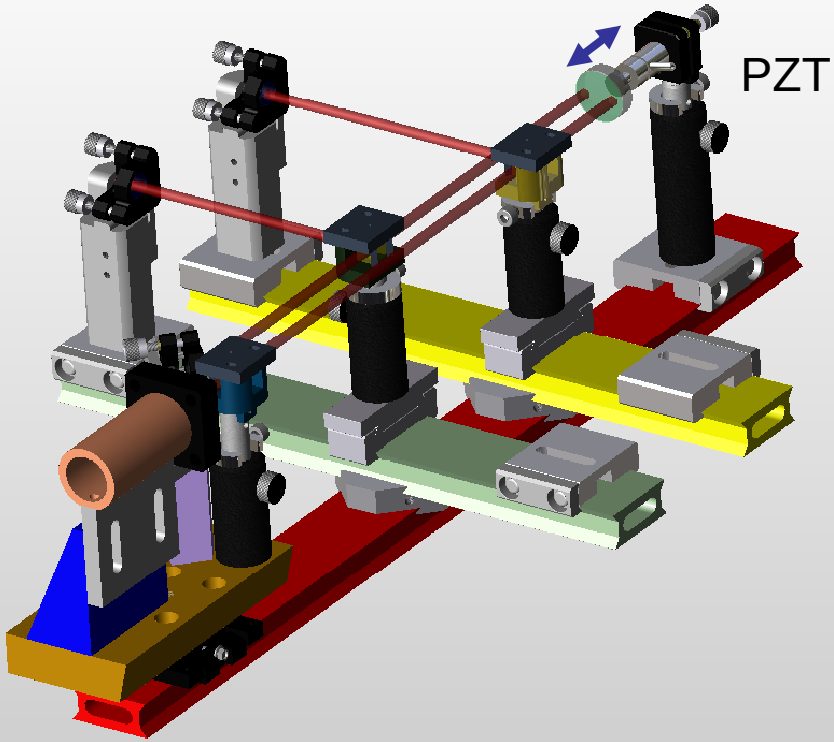
- More traditional Michelson setup leads to nice results.
- Integration of many interferometer into one node more difficult –
- A compact version is ready and shows promise.

Parallel Michelson

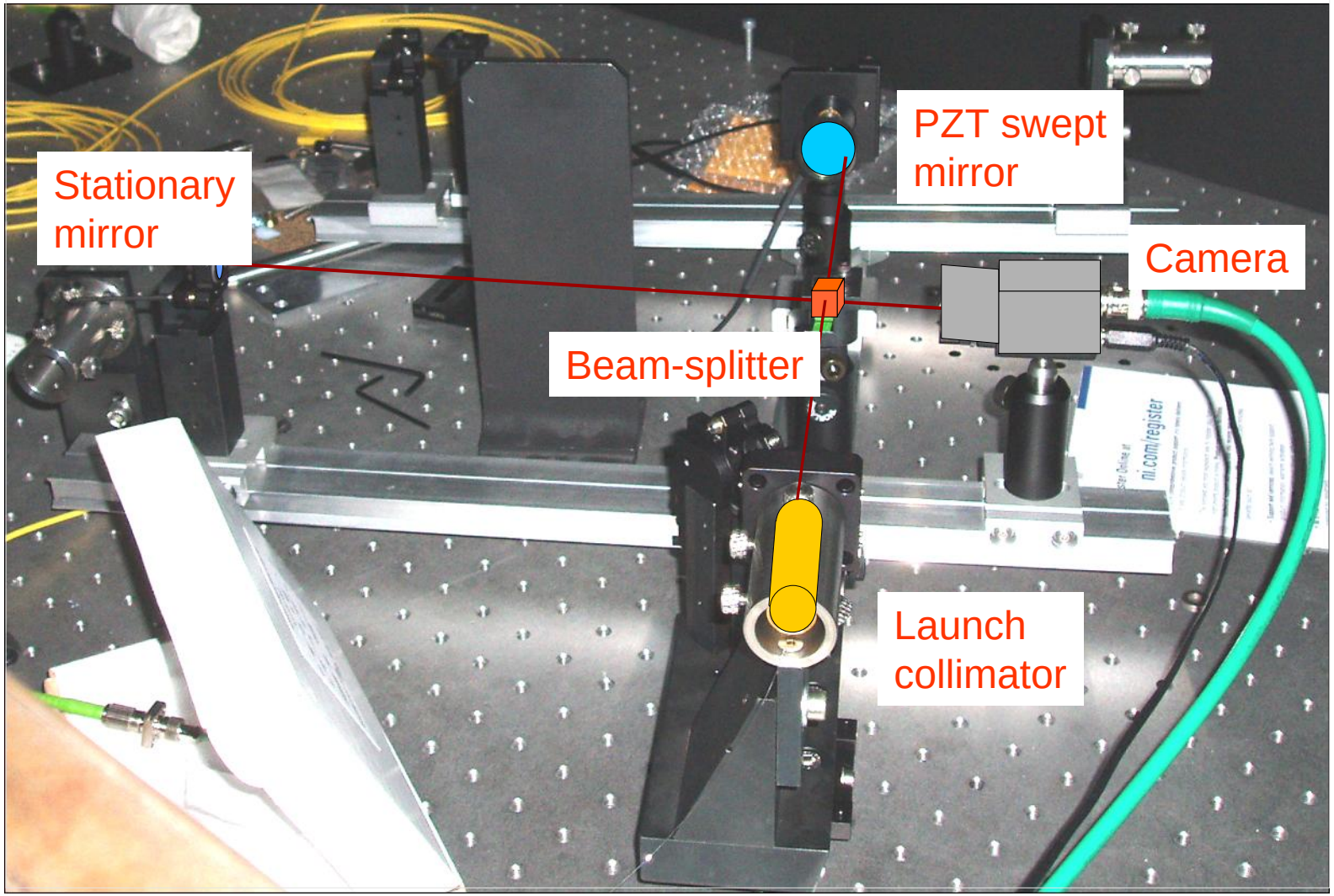
Original concept



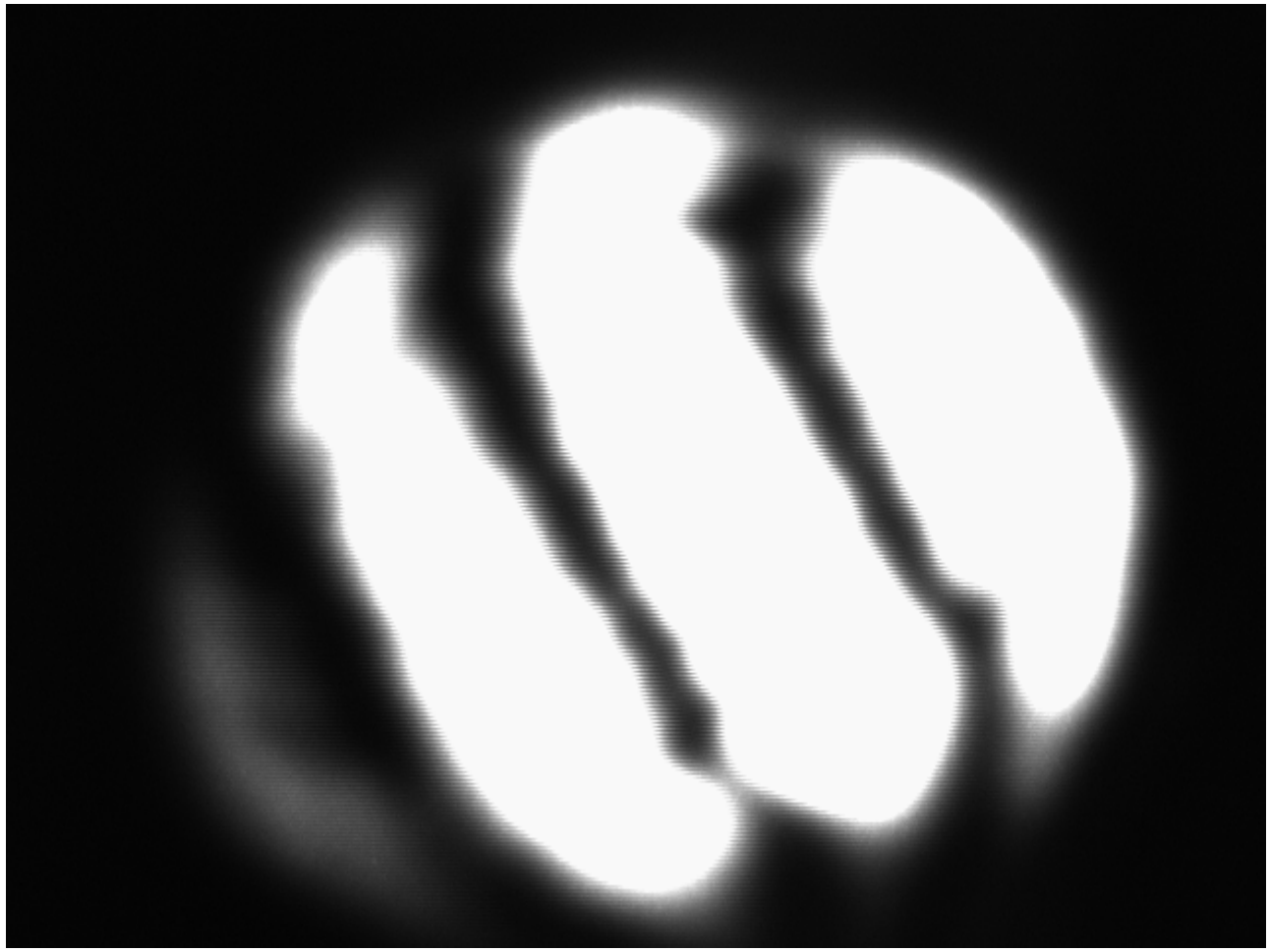
Mechanical design



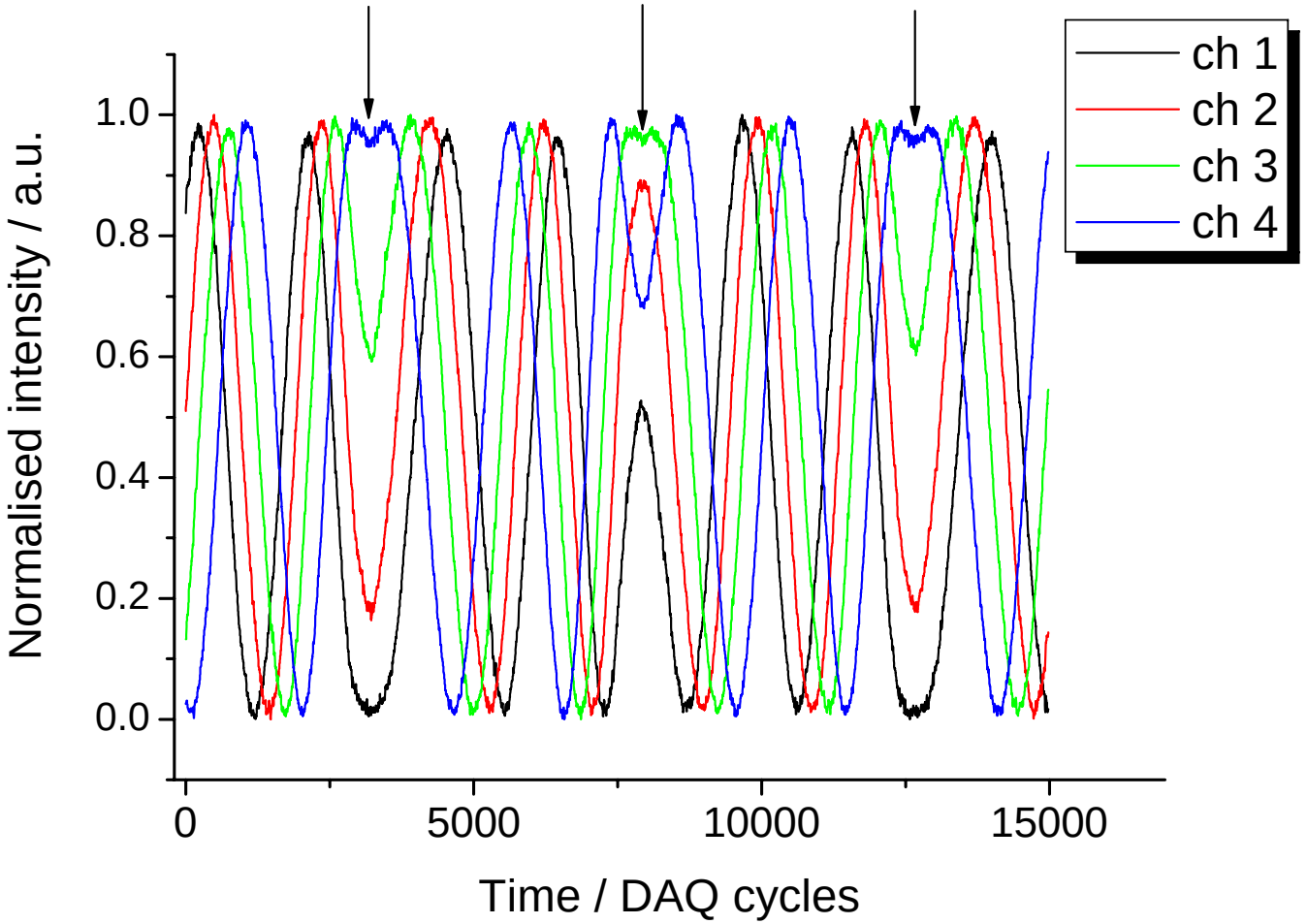
Michelson : realised in the lab



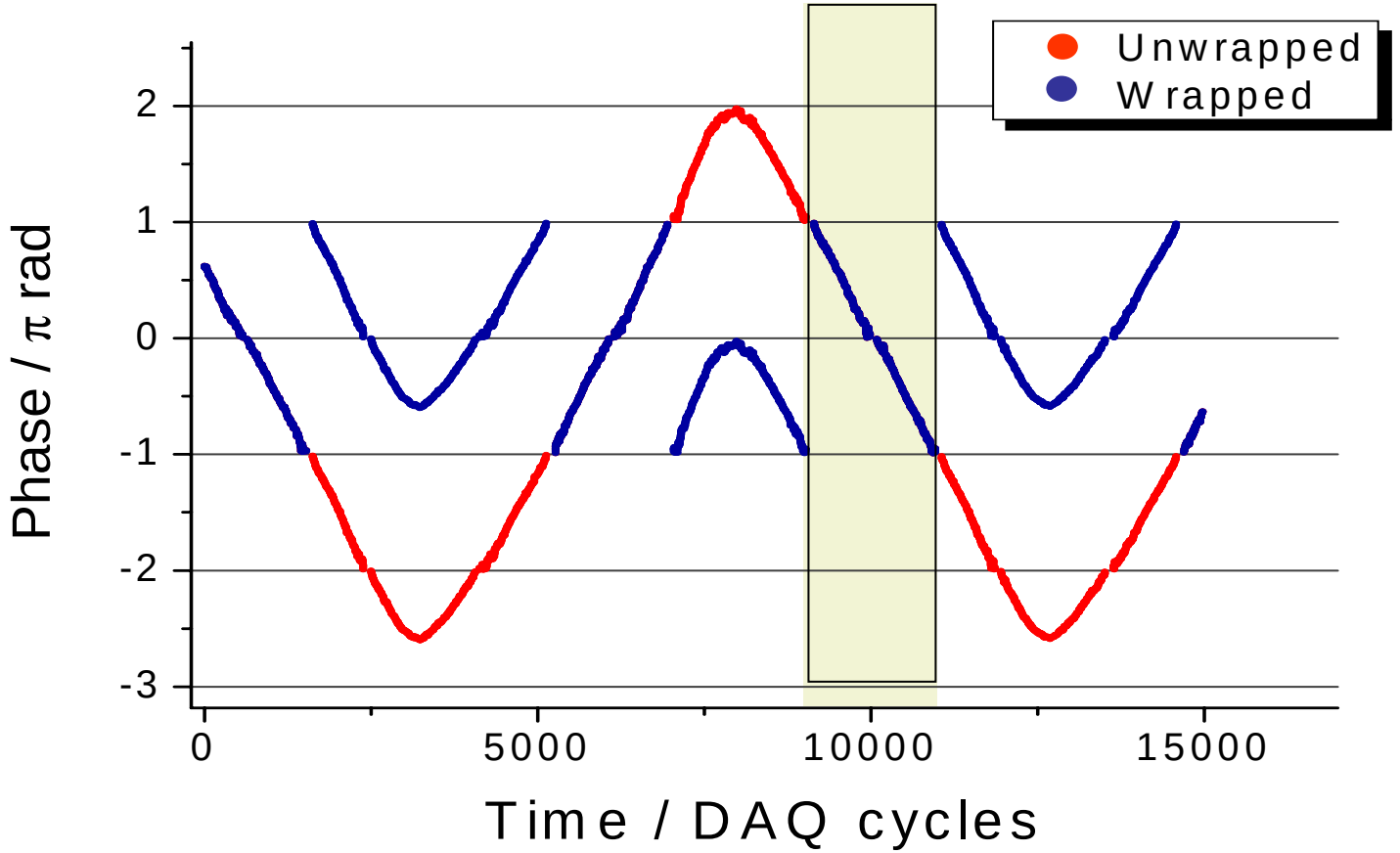
Michelson :
Camera view of mirror sweeping



Replaced camera with MT connector used 4 nearest neighbour fibres to read out



Use modified Carré algorithm to extract 4 channel average wrapped phase



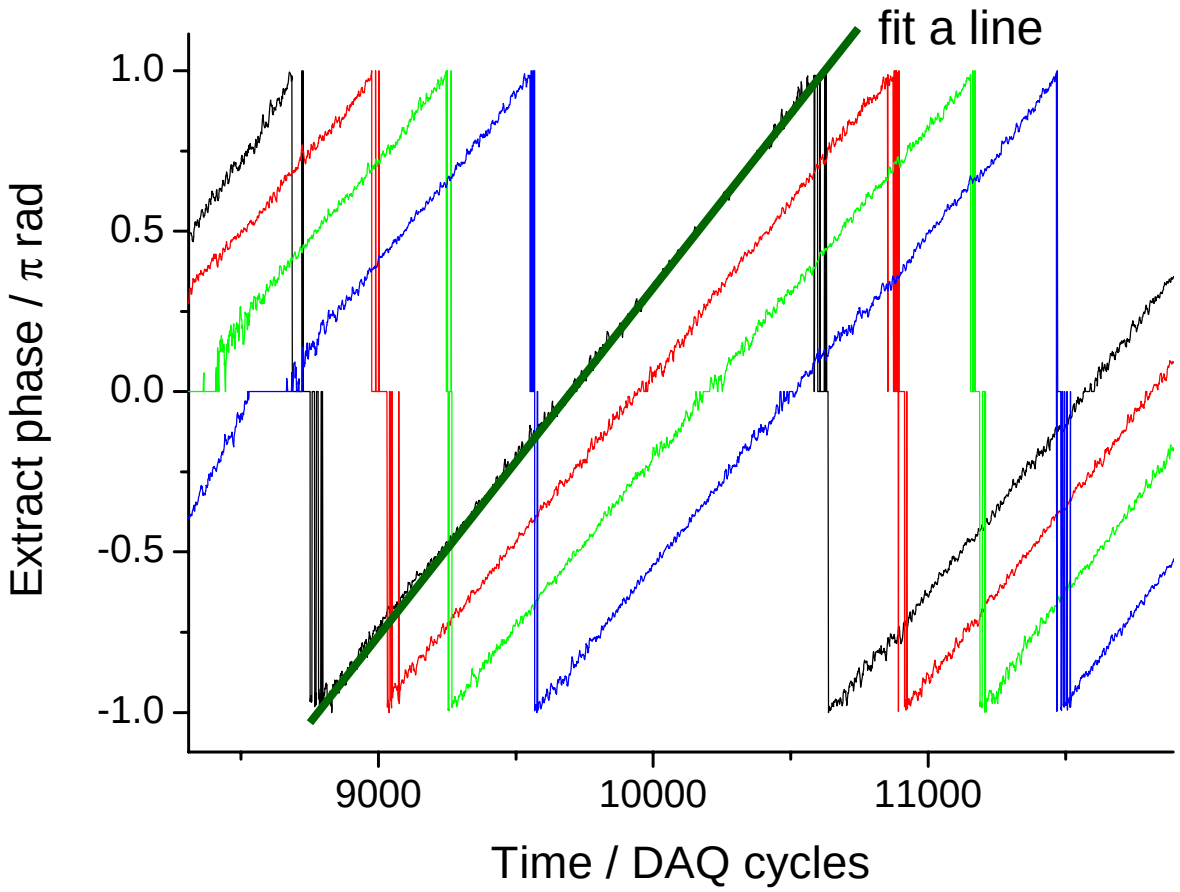
Use modified Carré algorithm to extract wrapped phase for each channel

Extract independently from each channel using 4 points separated equally in time

Here 320 cycles apart

Fit a line to each straight section around cycle 10 000 and extract residuals

1σ ~ 40 mrad
equivalent 10 nm



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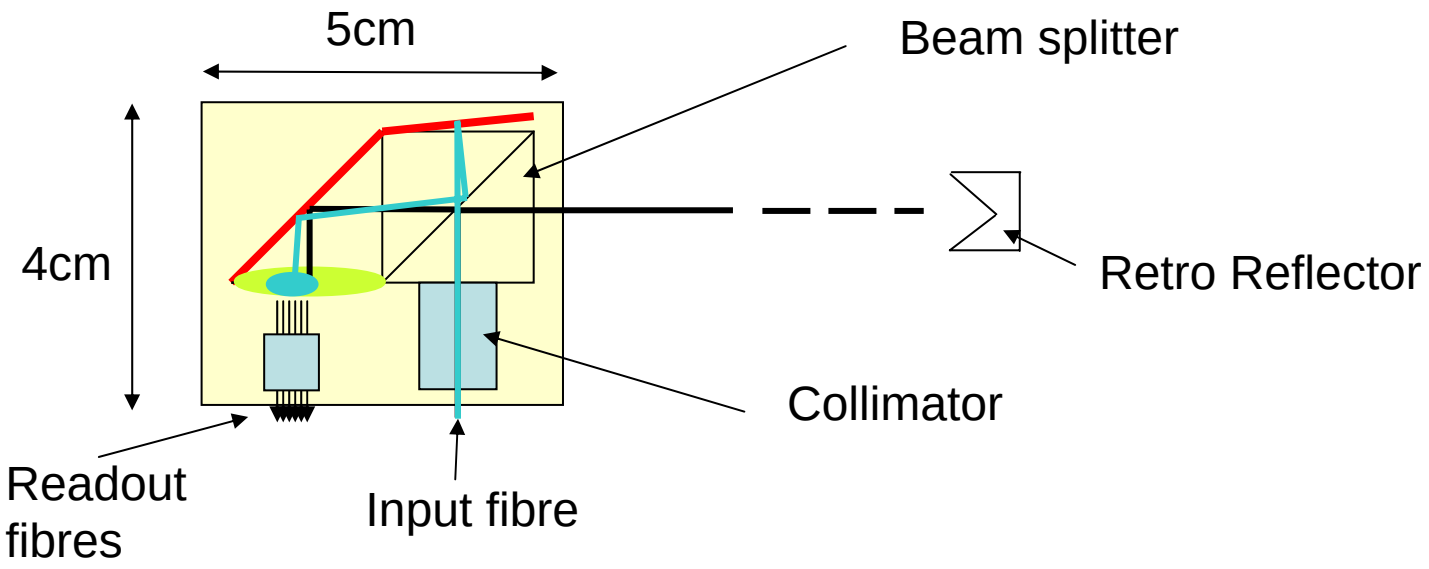
Compact Interferometer head



- Shown here using 2cm optics
- 1cm optics likely to work. According to Zemax simulation diffraction should not be a problem. (tests underway)

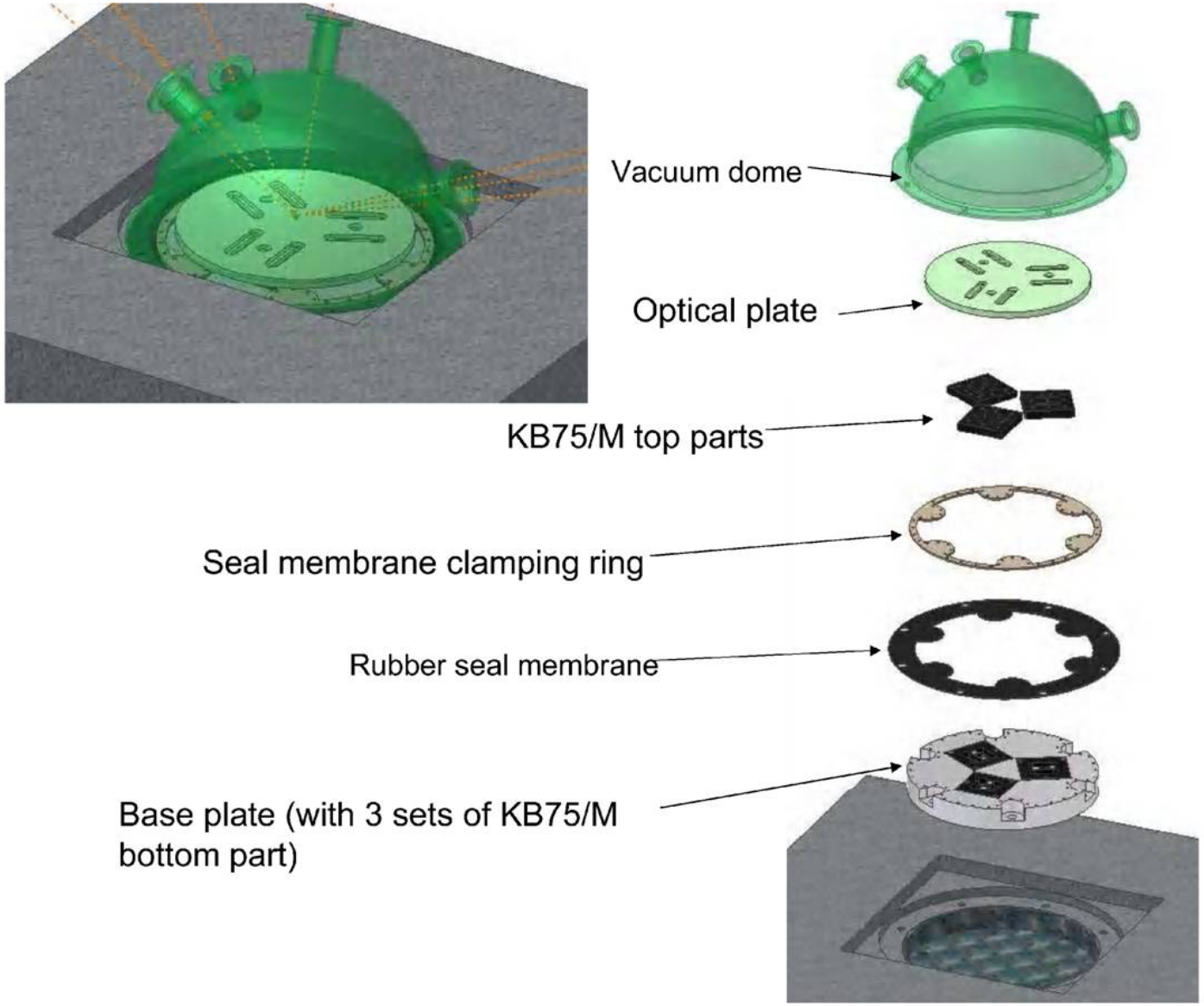
Status of Subsystems

- Electronics ready for mass production (in use by LiCAS, DC mode integrated for us)
- Temperature measurement system ready for mass production (24 channels built and tested)
- Readout software:
  - ADC Readout needs adaptation from LiCAS
  - Binary storage format ready
- FSI data analysis code:
  - Simple version working and used
  - In collaboration with LiCAS group implementing advanced object oriented analysis framework.
- Evaluation of Laser to buy for ATF setup finished by end of January.
  - New laser available by end of February

Mass Production of Interferometer

- Full test of present system in air.
- Test vacuum system for laboratory:
  - Design ready to build vacuum test system
  - Available in February
  - Test present setup in vacuum
- Vacuum fibre feedthrough:
  - Commercial feedthrough too expensive:
    - Build own feedtroughs
    - Jig in production now
    - First workable feedthroughs by February to be used in test vacuum system
- Build Jig to place/glue components (beamsplitter and collimator) precisely onto base.
  - Build first model by March

Vacuum system at ATF



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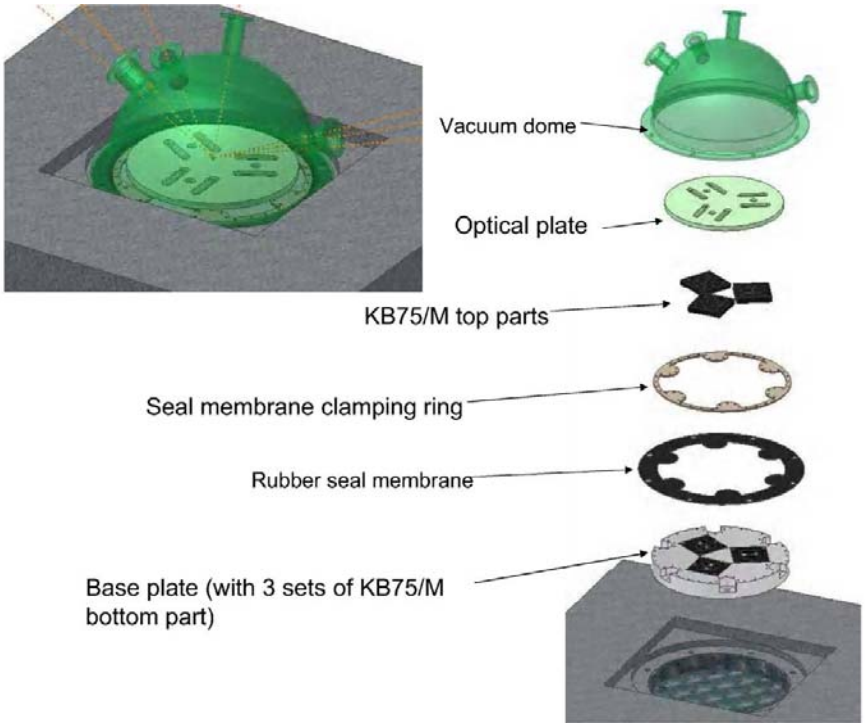
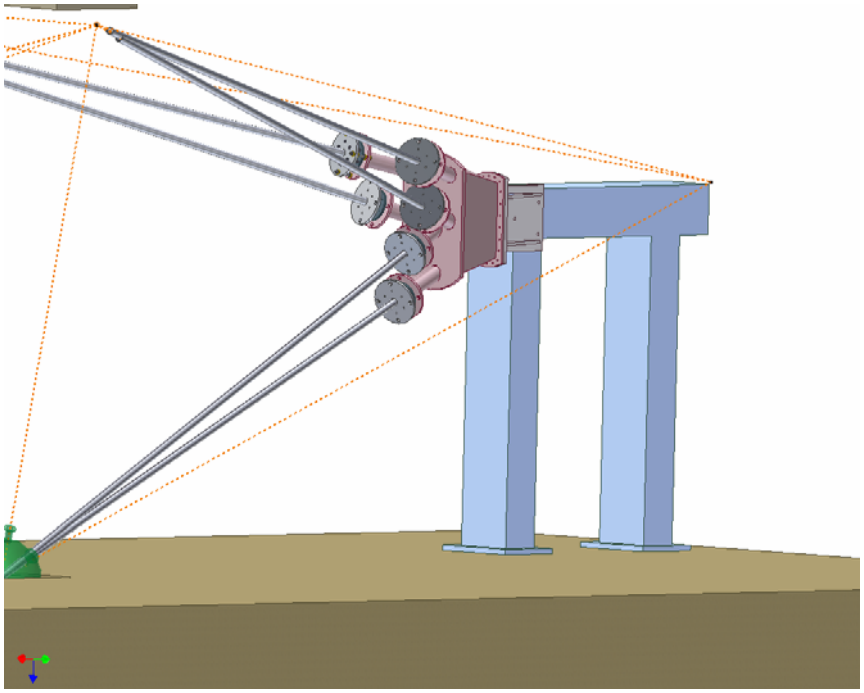
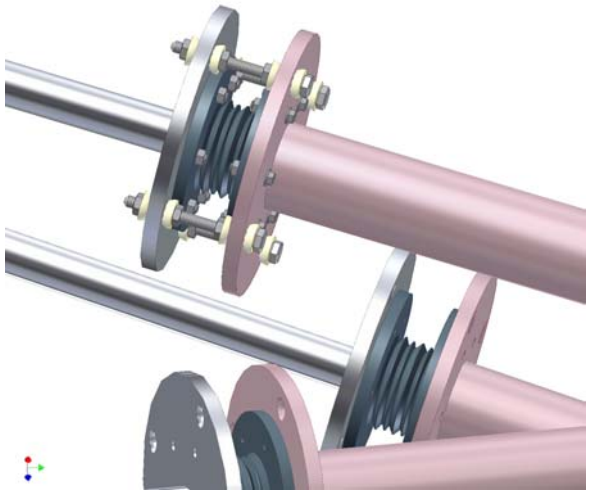
Vacuum system at ATF



- Triangle Nodes Concept
  - Drawings ready for base plate
  - Construction of base plateby March
  - Construction of instrument platform and dome by May

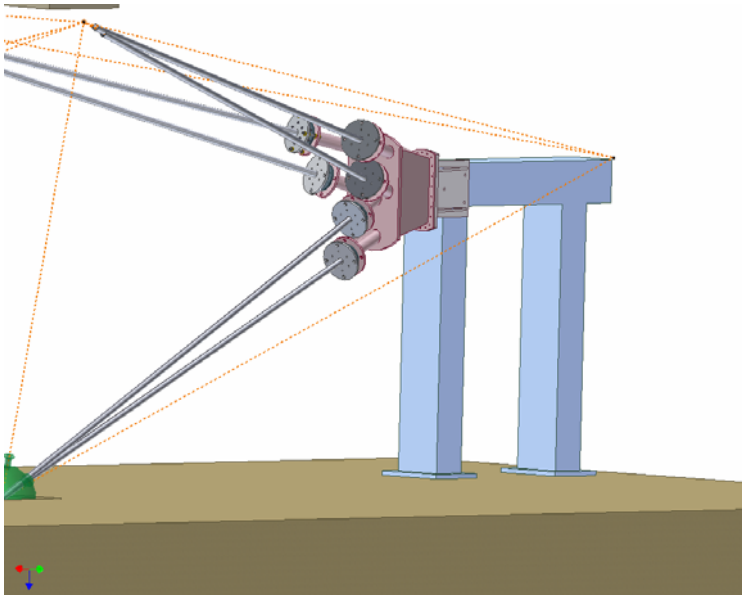
KEK BPM nodes

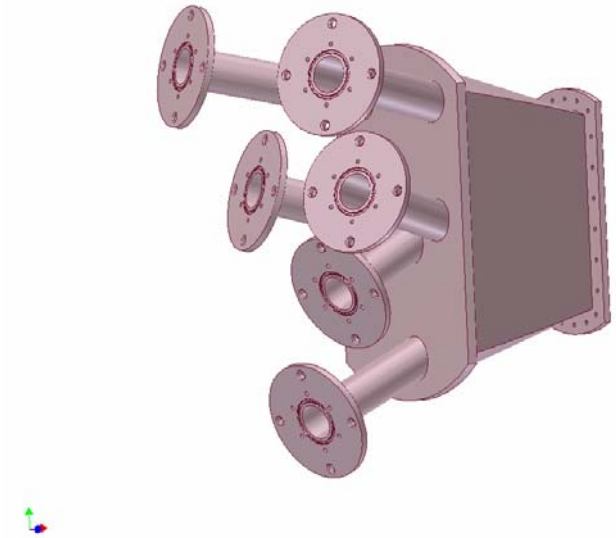




- Concept allowing for considerable angle play.
- Fixed (or single bellow) attachment to KEK aluminum bar.
- Installation early summer 2007

Move to ATF2

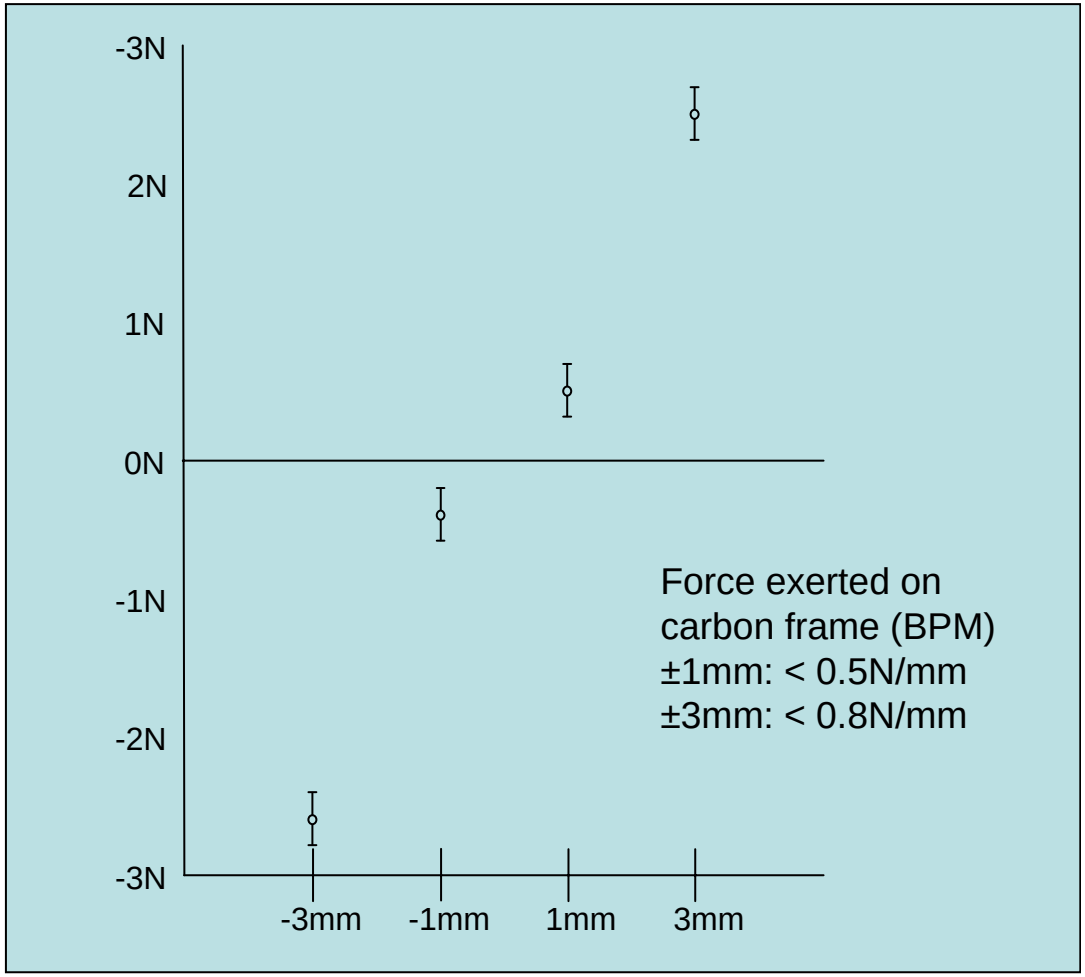




- If 2 nano-BPM setups at ATF2 beam line available:
  - Within reasonable distance between each other.
  - Moving experiment to ATF2 beam line can be considered.
- Requirements:
  - New scaffolding and floor plate
  - New “flowerpots”

SLAC/LLBL BPM Node

- Needs bellow to allow motion of BPM
  - Vacuum causes a force order of 100N!
- Develop small force vacuum mount using double bellow system.
- Allows small motion (~1 mm) of BPM-system (we still can measure)
- Large motion (5-10mm) are possible but we cannot measure anymore
- Test stand to measure remaining (perpendicular) force on BPM frame.



Force exerted by perpendicular motion

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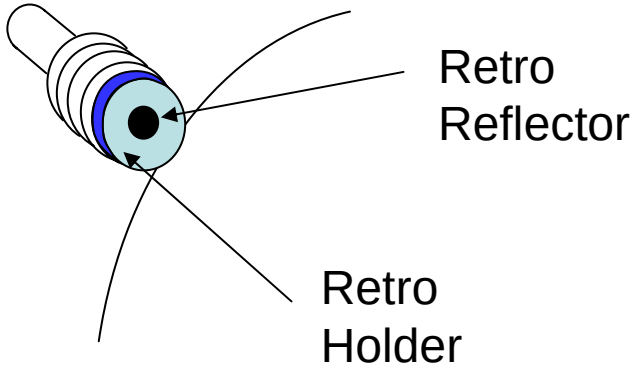
- Next item to design is retro holder object: a small tube with vacuum flanges for both bellows at the end.
- Plan to mount in March



- “Flower pot” design needed by March; built in May
  - Flower pot attached to scaffolding not carbon fibre tube!

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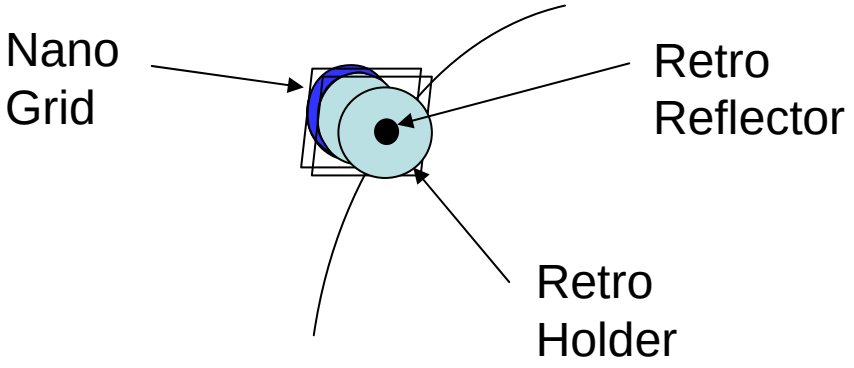


- Allow for true non-touching setup
  - More difficult analysis

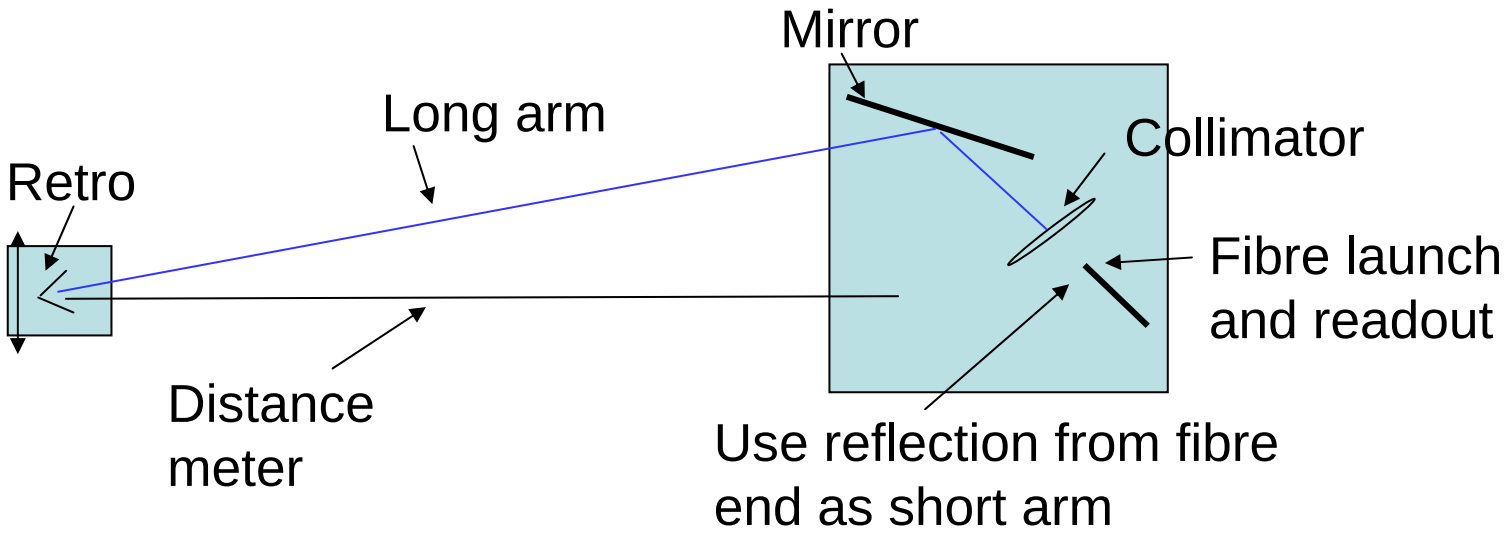
Combining all Measurement

- Three systems have to be operated simultaniously:
  - 3 SLAC-BPMs define beam direction
  - 1 KEK Q-BPM measures motion with respect to that direction. This BPM is still present on the original motion stage. It can be correlated to the aluminium bar via a Michelson interferometer.
  - MONALISA measures relative motion of two BPM systems.
- Isues to be solved:
  - Read KEK BPM with SLAC readout system
  - Align two BPM system that both get optimal measurements

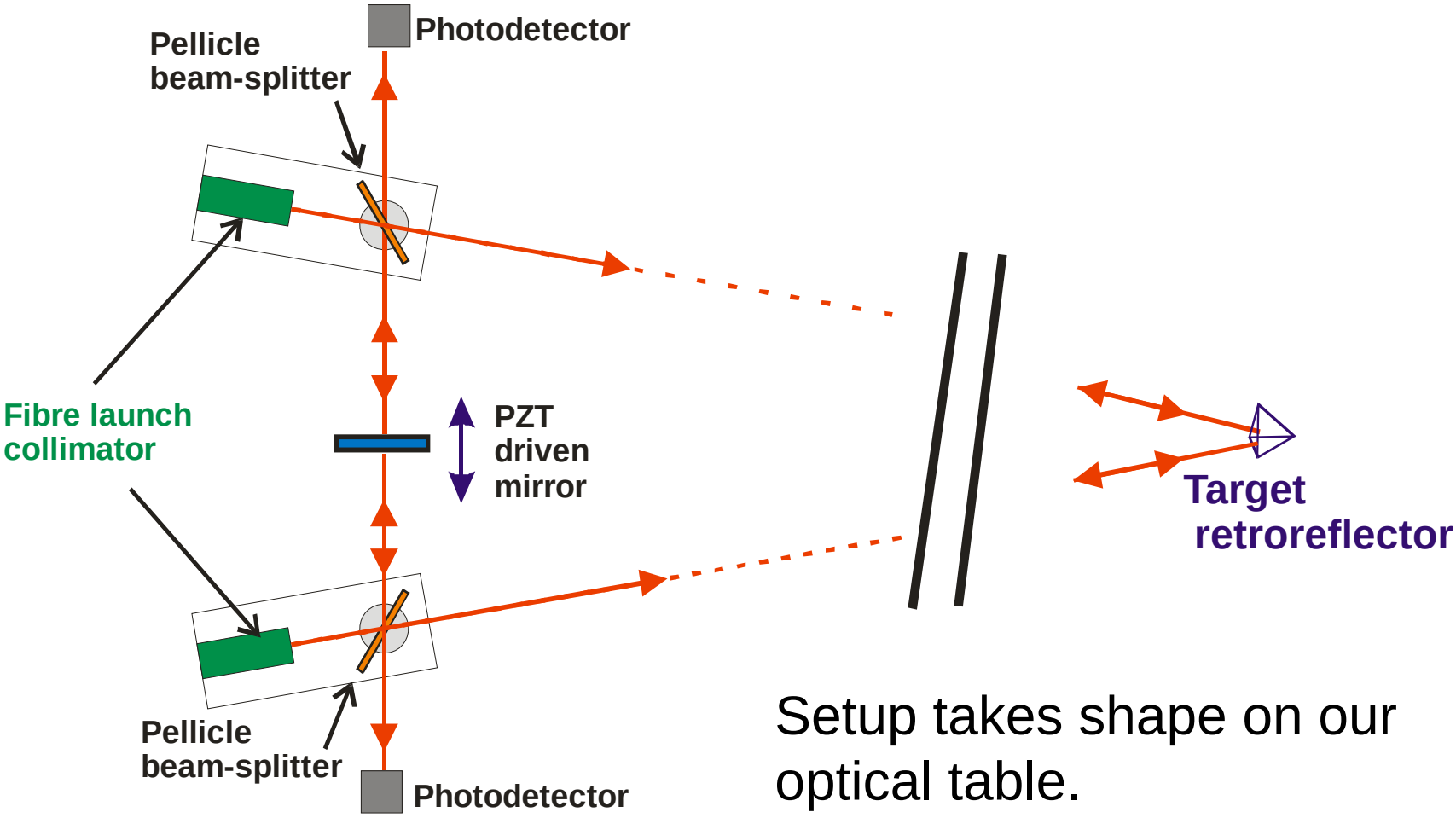
We would like to ask if this can be demonstrate before we install MONALISA.

ATF2: Measuring Motion of Shintake Monitor with Respect to Final Doublet

- Idea of Compact Straightness Monitor (CSM) presented in May:



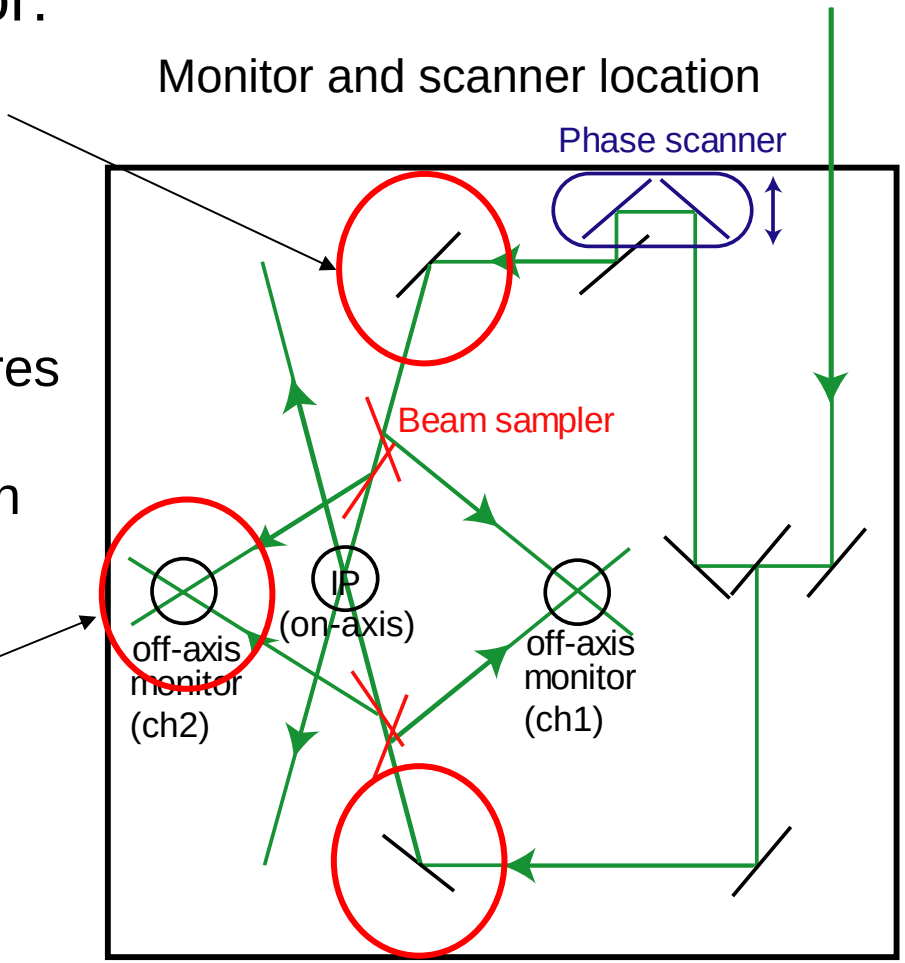
Binocular Michelson



Setup takes shape on our optical table.

Attaching CSM: Shintake Monitor

- What do we want to monitor:
- Monitor motion (angular vibrations) of “intersection mirrors”
  - Its already a mirror
  - Has to be done in air (Requires close distance monitor)
  - Needs to correlate the motion measurements of the two mirrors.
- Monitor off-axis camera
  - Easier setup
  - Mor indirect measurement



Attaching CSM: Focusing Magnet

- Unsolved Problem on how to monitor magnetic centre of focusing magnet.
  - Attach CSM to one point of magnet
  - Use several distance metres to monitor breathing of magnet
  - Correlate with temperature measurements