DC Readout at the 40m

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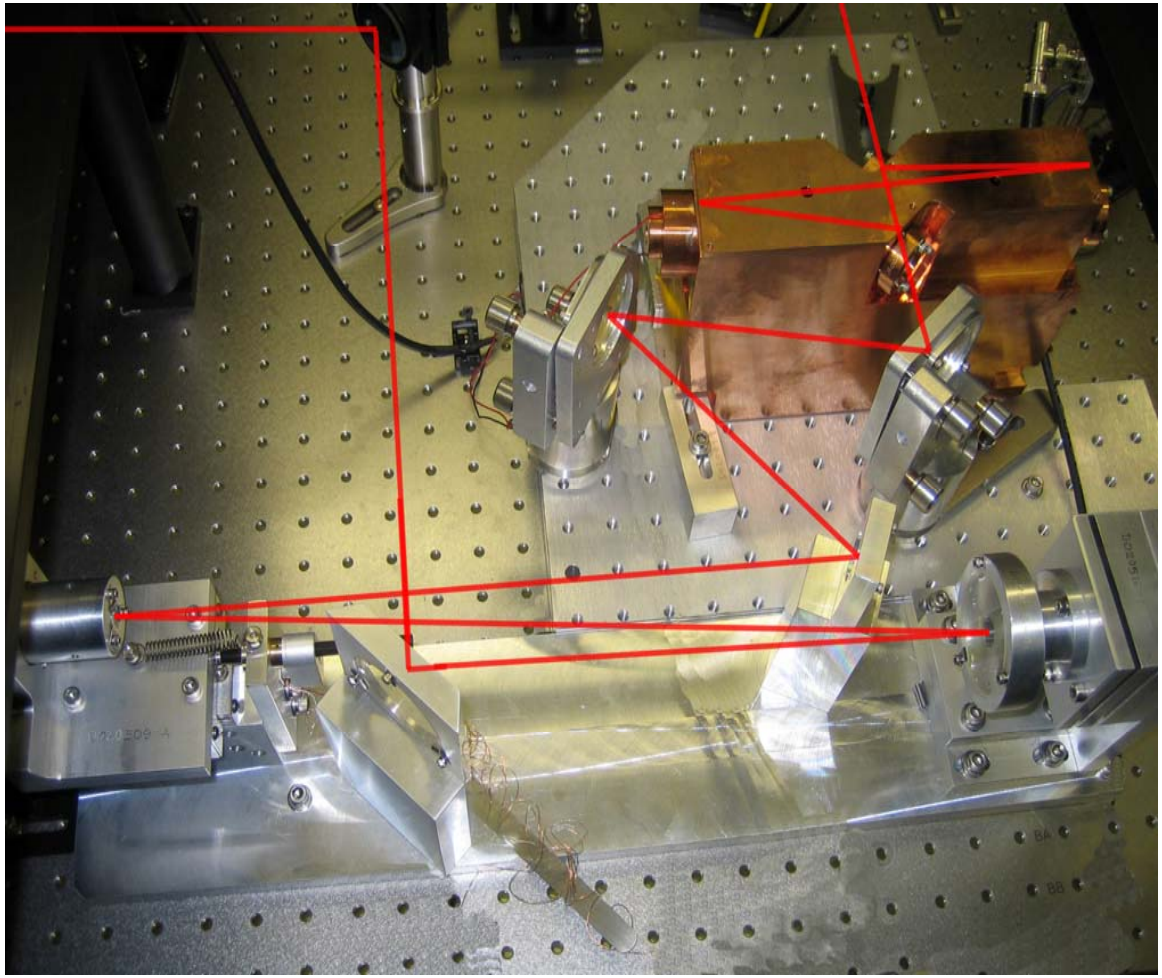
DC Readout

- Initial LIGO uses RF phase modulation of input beam to read signal
  - RF sidebands as local oscillator
- DC readout is new readout scheme for Advanced LIGO
- Uses amplitude modulation of main laser field as GW signal
- Eliminates several noise sources
- Requires new in-vacuum hardware

In-air setup

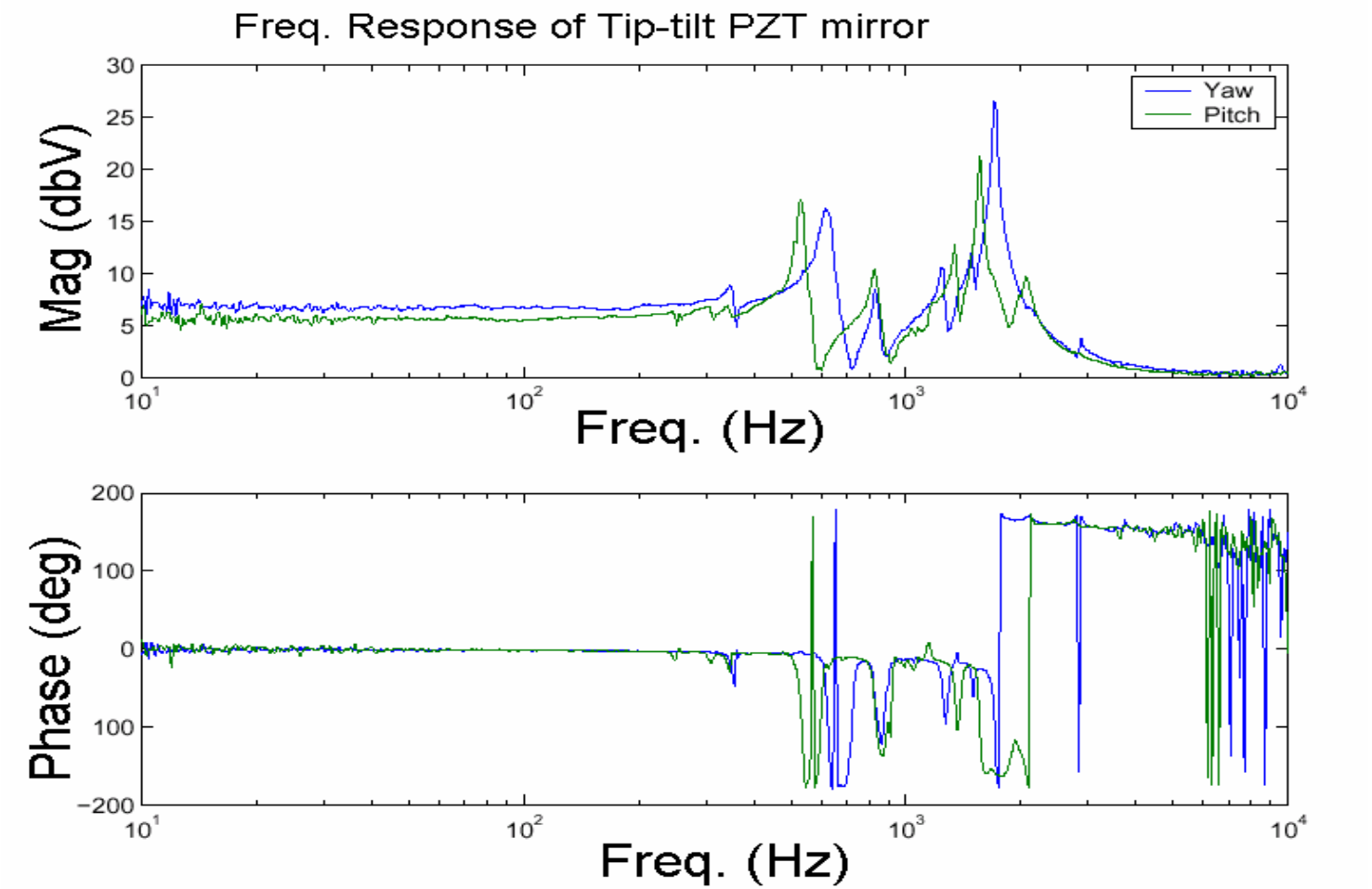
- Two tip-tilt PZT alignment mirrors
- Mode-matching telescope (MMT)
- Output mode cleaner (OMC)
- Two DC photodiodes



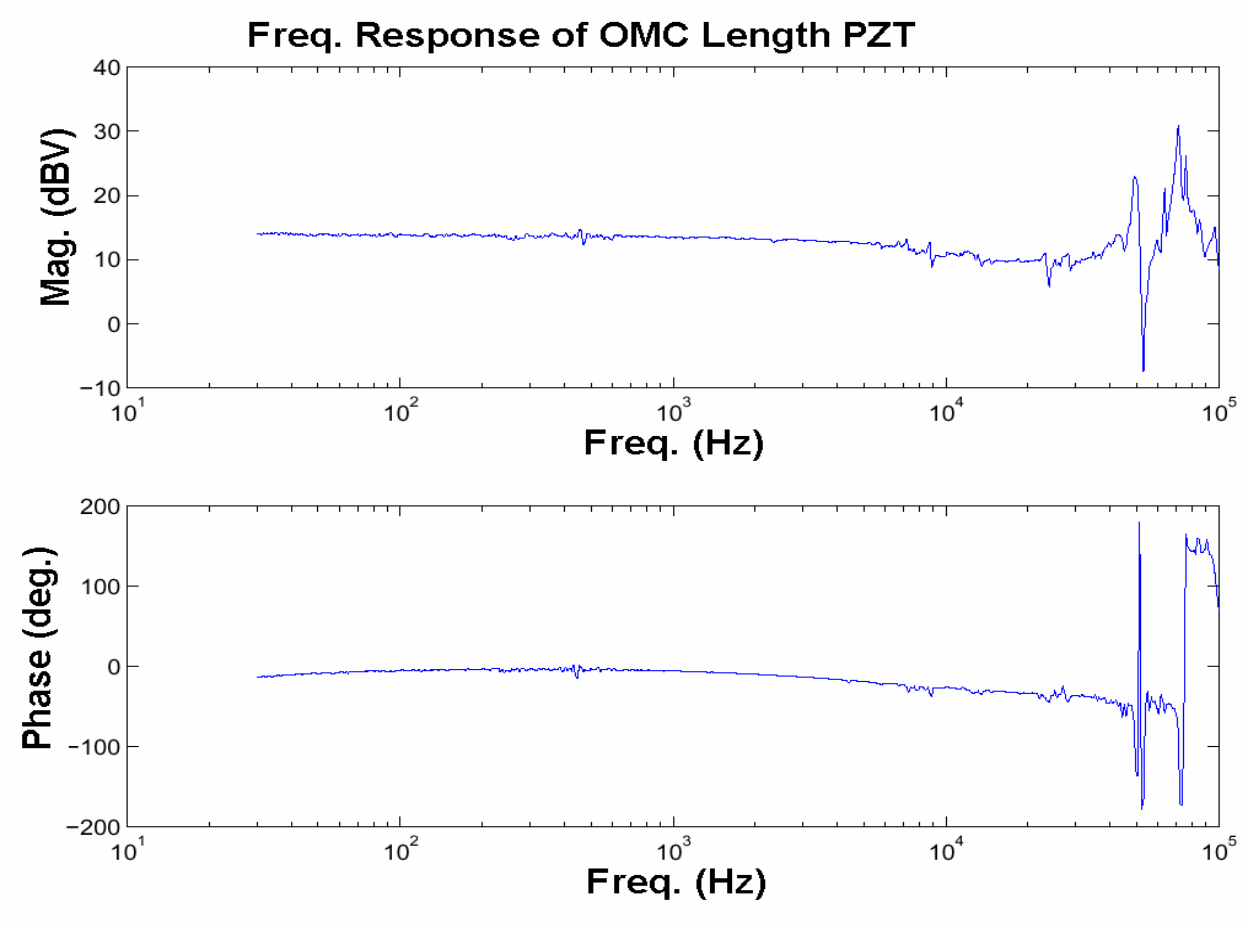
Progress

- In-air setup and alignment
- Characterization of components
- Hardware completely disassembled
- Hardware prepared to go in vacuum
- Fiber-coupled laser to two 50m fibers

Characterization of PZT's



Characterization of PZT's



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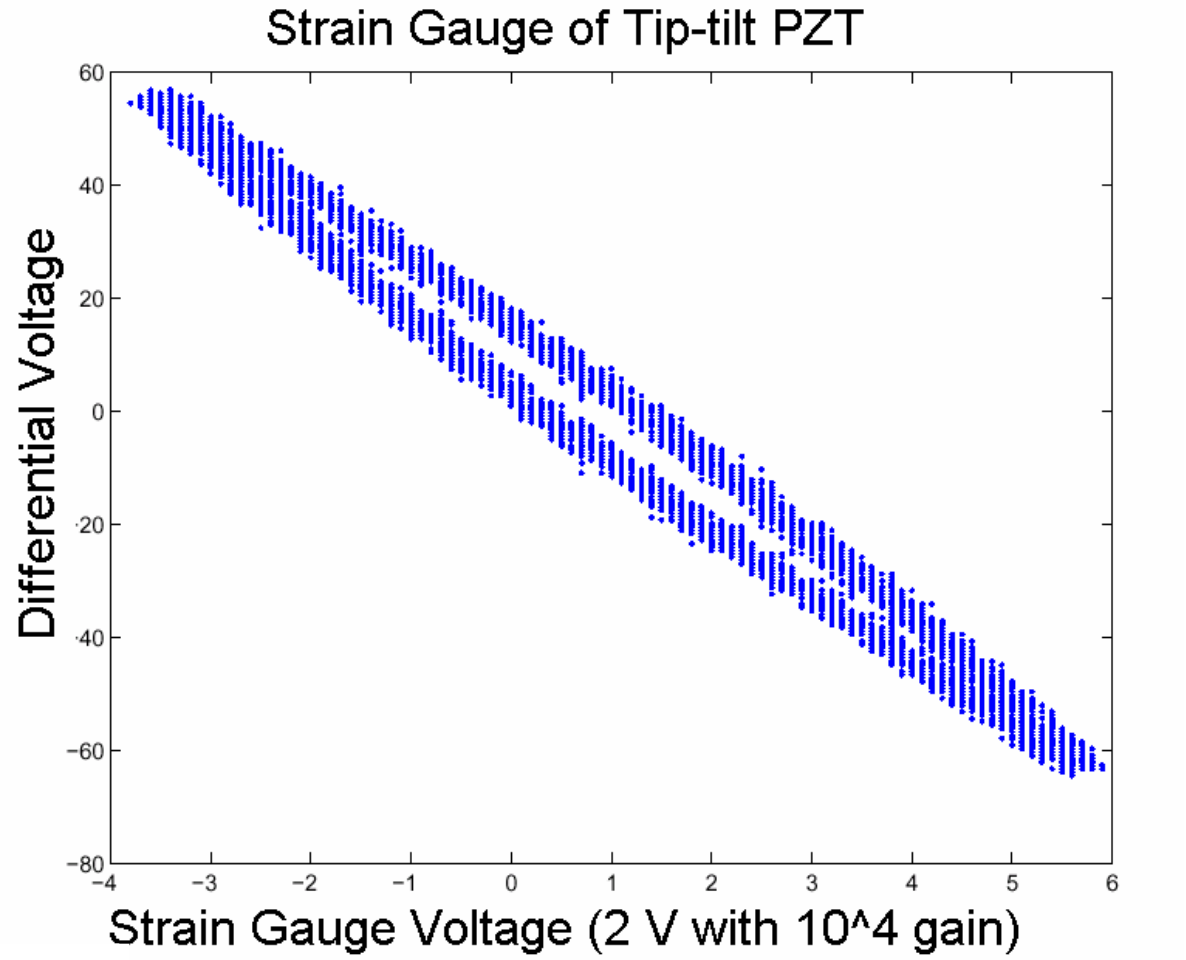
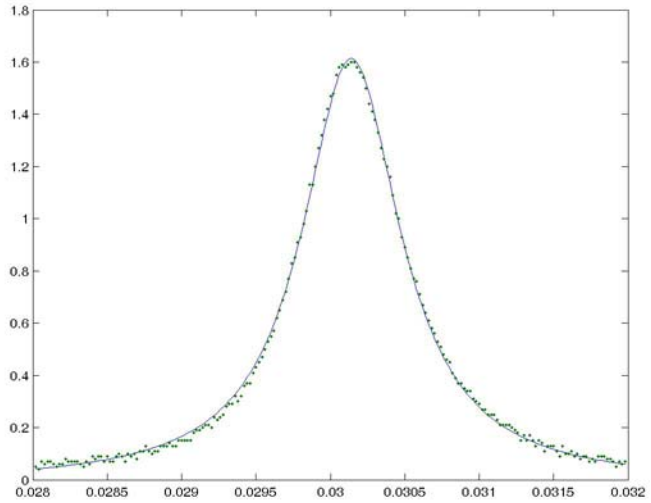
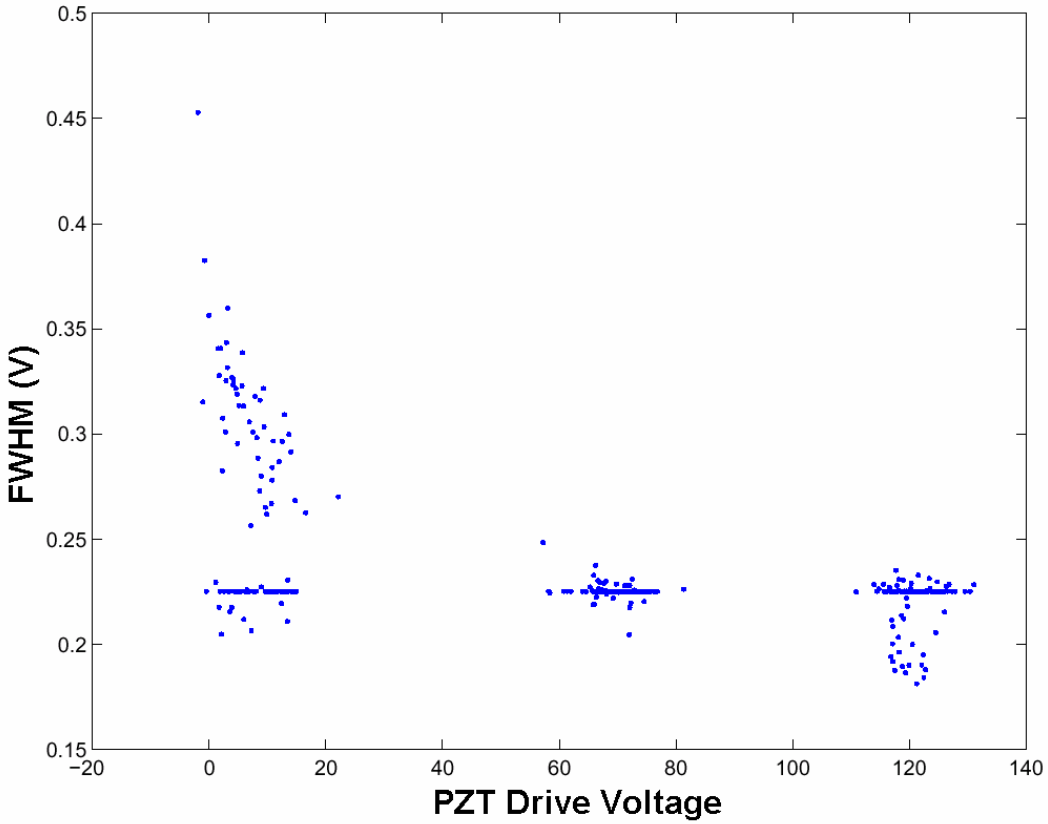


Length PZT in OMC

- Voltage response of length PZT: 8.3 nm/V
- Determined linearity of response by measuring FWHM with voltage offset

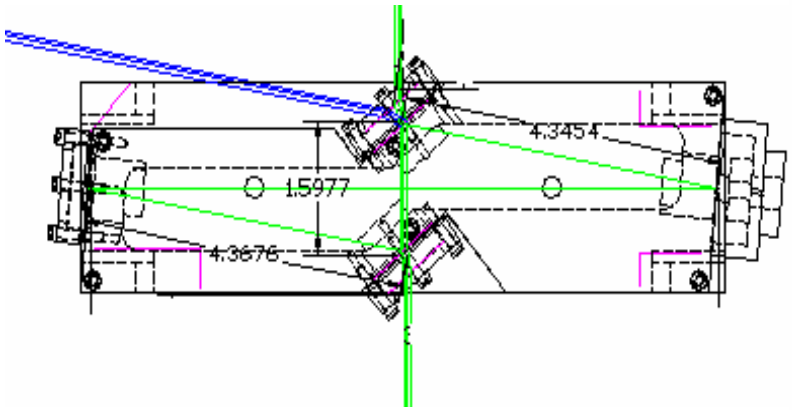


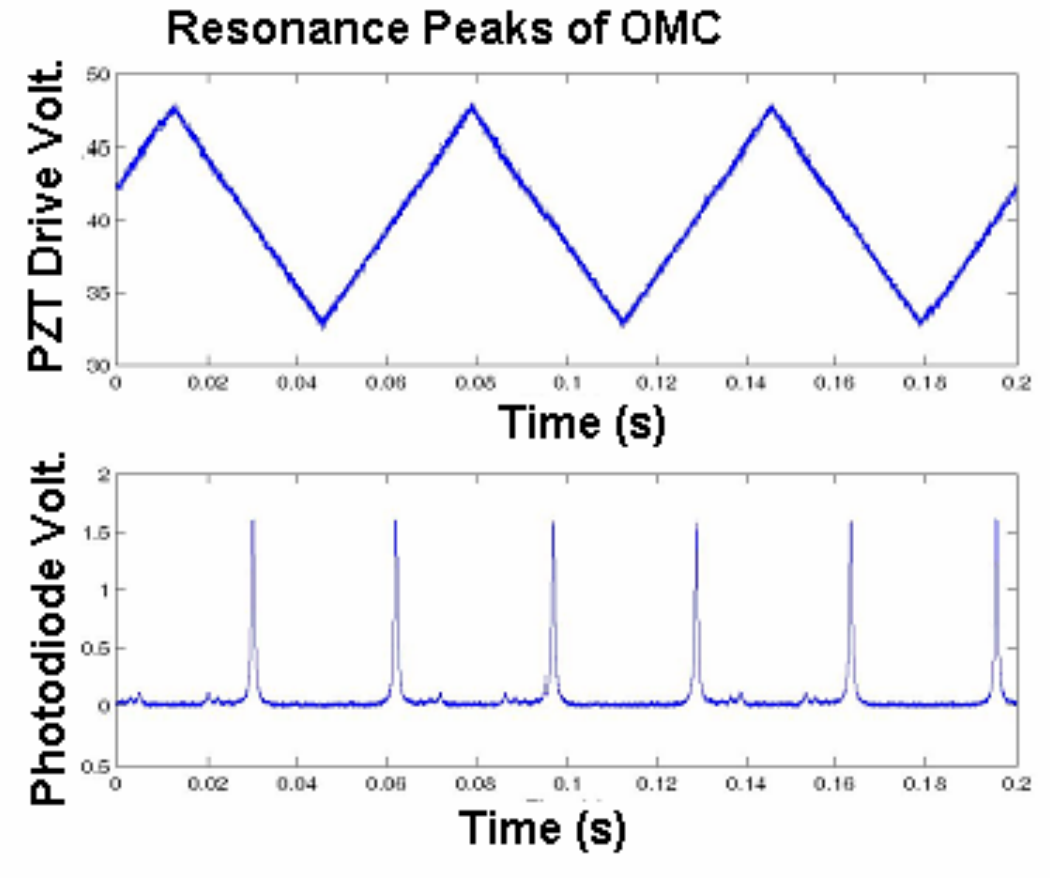
Fit of Data to Lorentzian Peak



Output Mode Cleaner

- Finesse : 190
- Locked transmission : 95%
- Loss per round trip : 0.1%





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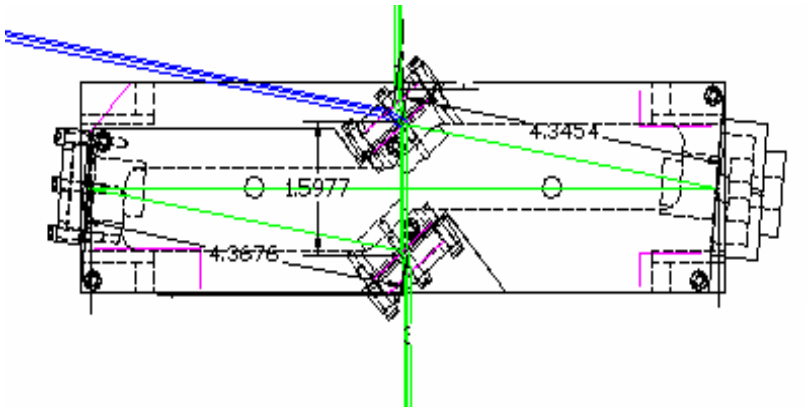

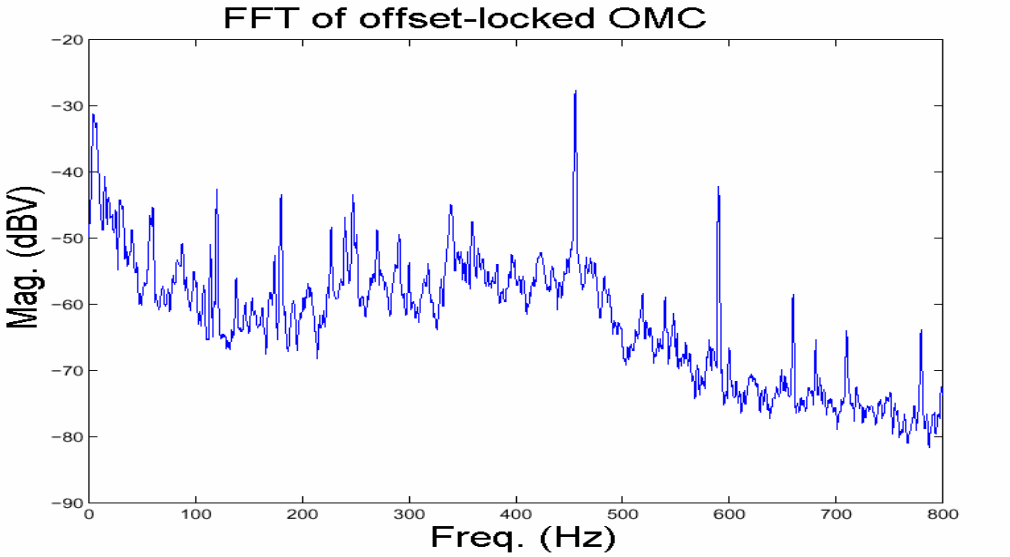

Plans

- Will assemble and pre-align setup in clean room
- Will install aligned setup in vacuum chamber
- Align with SRM using back-propagating light