

OMC Design considerations

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LSC/Virgo Meeting

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G070166

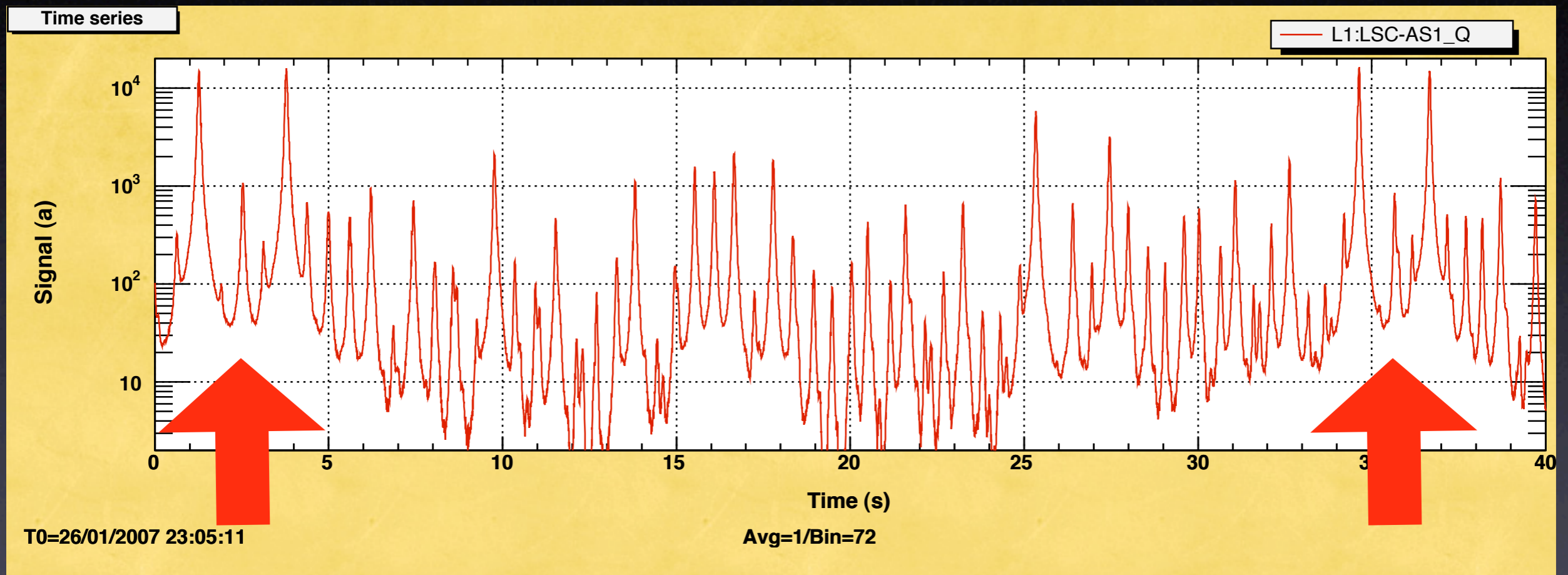
Designs inputs

- http://ilog.ligo-wa.caltech.edu:7285/advligo/Output_Mode_Cleaner
- Peter Fritschel: T040018
- Keita Kawabe: T040158
- Enhanced LIGO Design: T060156

Design Goals

- DC readout
 - Filter RF sidebands from AS port
 - Attenuate Higher Order Modes (HOM)
- Active alignment control
- Mechanical resonances of OMC “out of GW band”
 - Body modes > 1 kHz
 - Dither frequencies > 1 kHz
- Flexible 4 mirror design

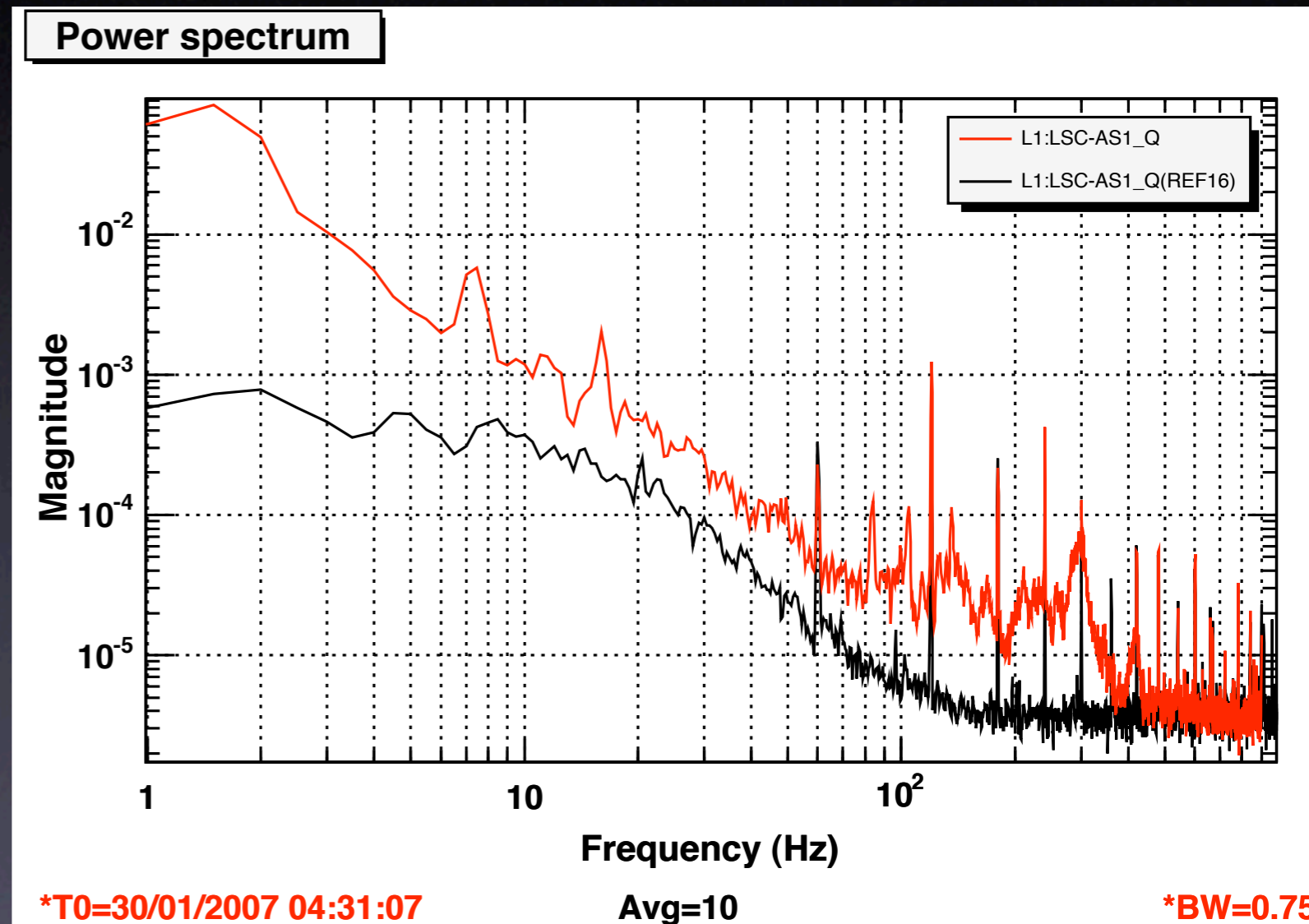
Input from the IFO



- Work at LLO in winter 2007
- Rupal Amin, Valera Frolov, et al.

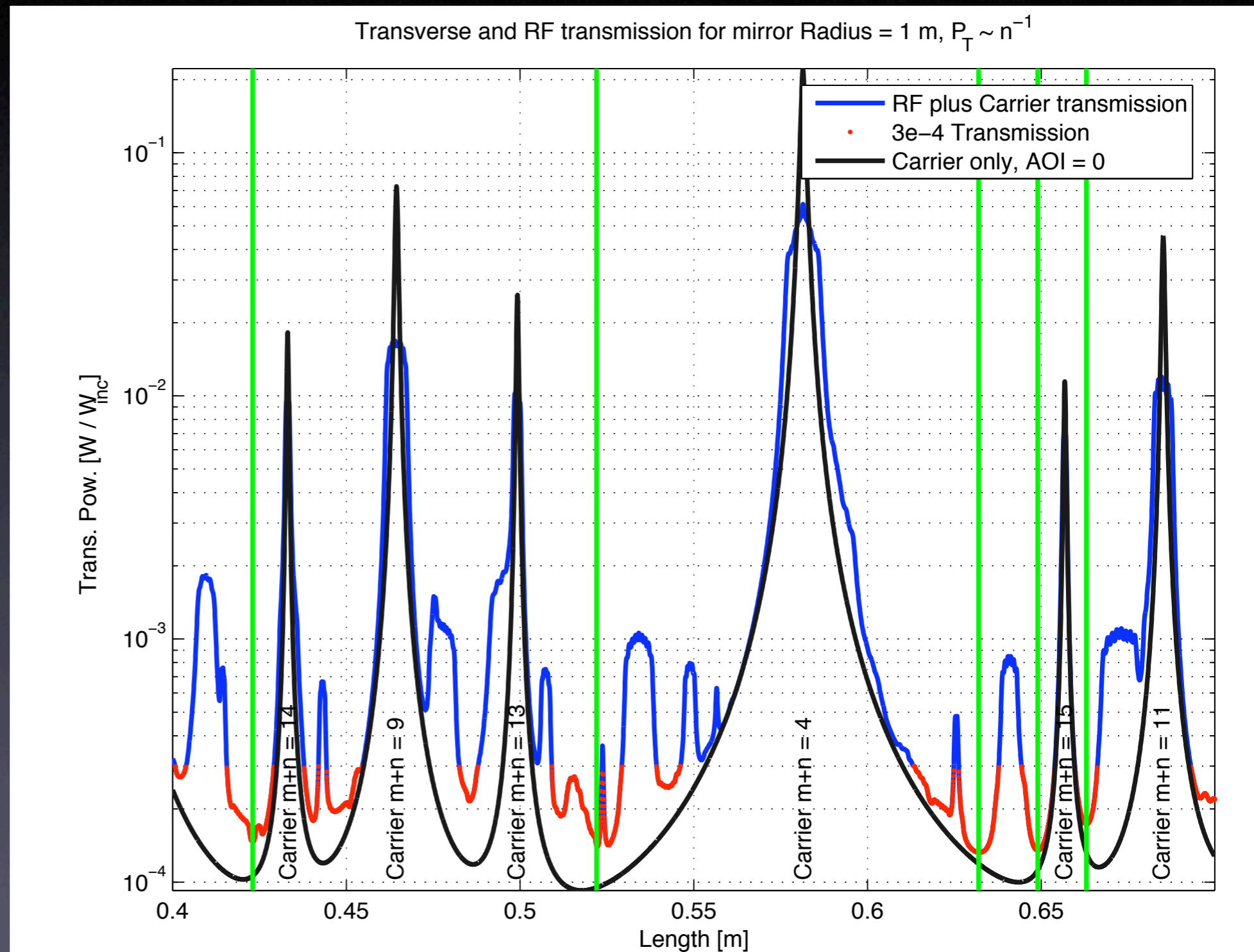
Locked pOMC

- pOMC dither locked to 2 W bright Michelson
- Acoustic noise to 500 Hz
- Detector noise floor above



Cavity g-factor

- Reasonable guess for HOMs
- Overestimate of RF amplitude
- SB on SB, HOM to 8th order
- Astigmatism for 7 deg.AOI

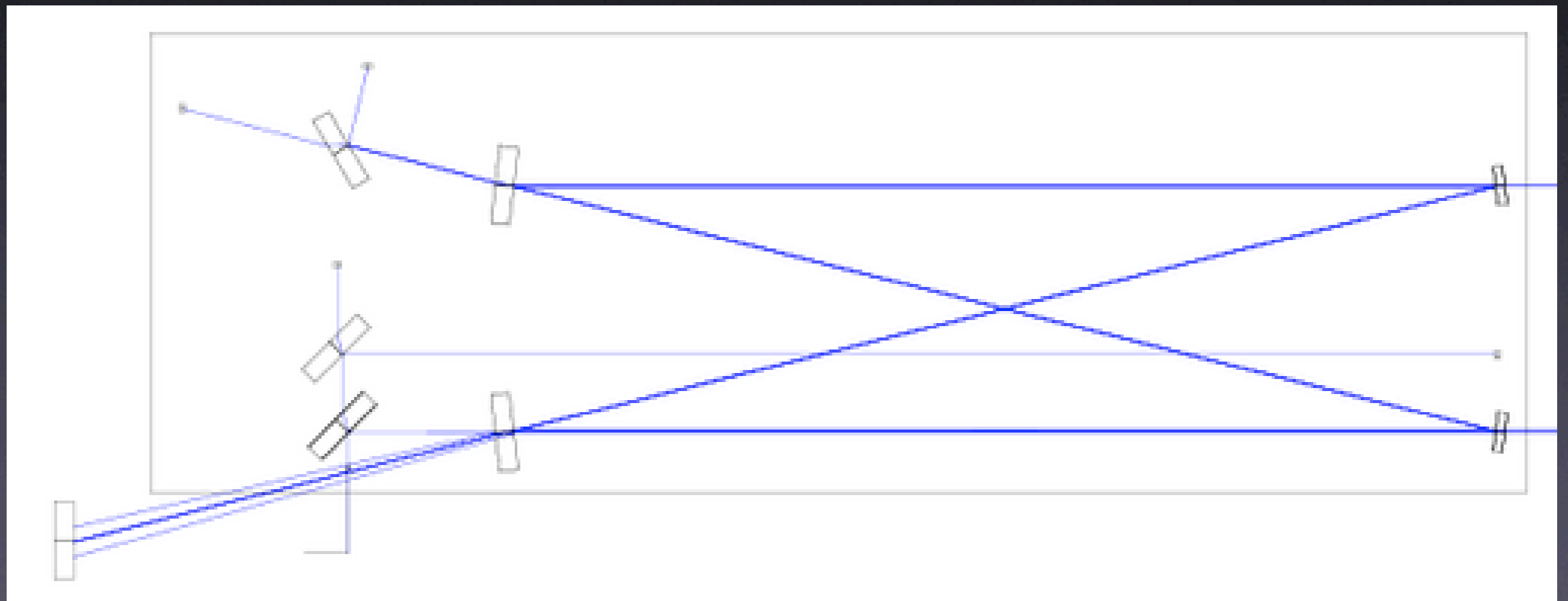


Selected Design

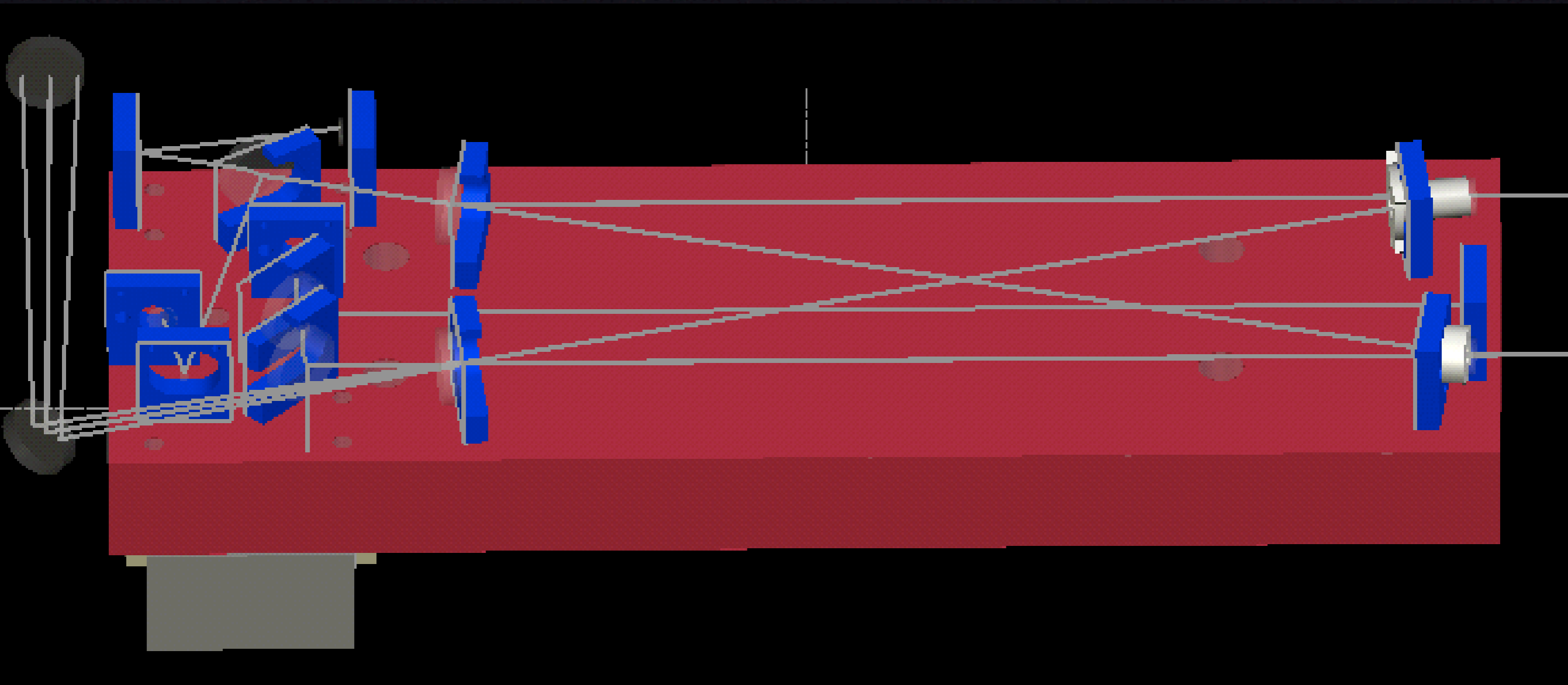
- 4 mirror cavity
- 2 curved mirrors, 2 m Radius of Curvature
- 0.65 m length
- 6.5 deg Angle of Incidence
- Suspended monolithic cavity with integrated PDs
- 500 micron beam waist, 700 micro-rad div.

Cavity Layout

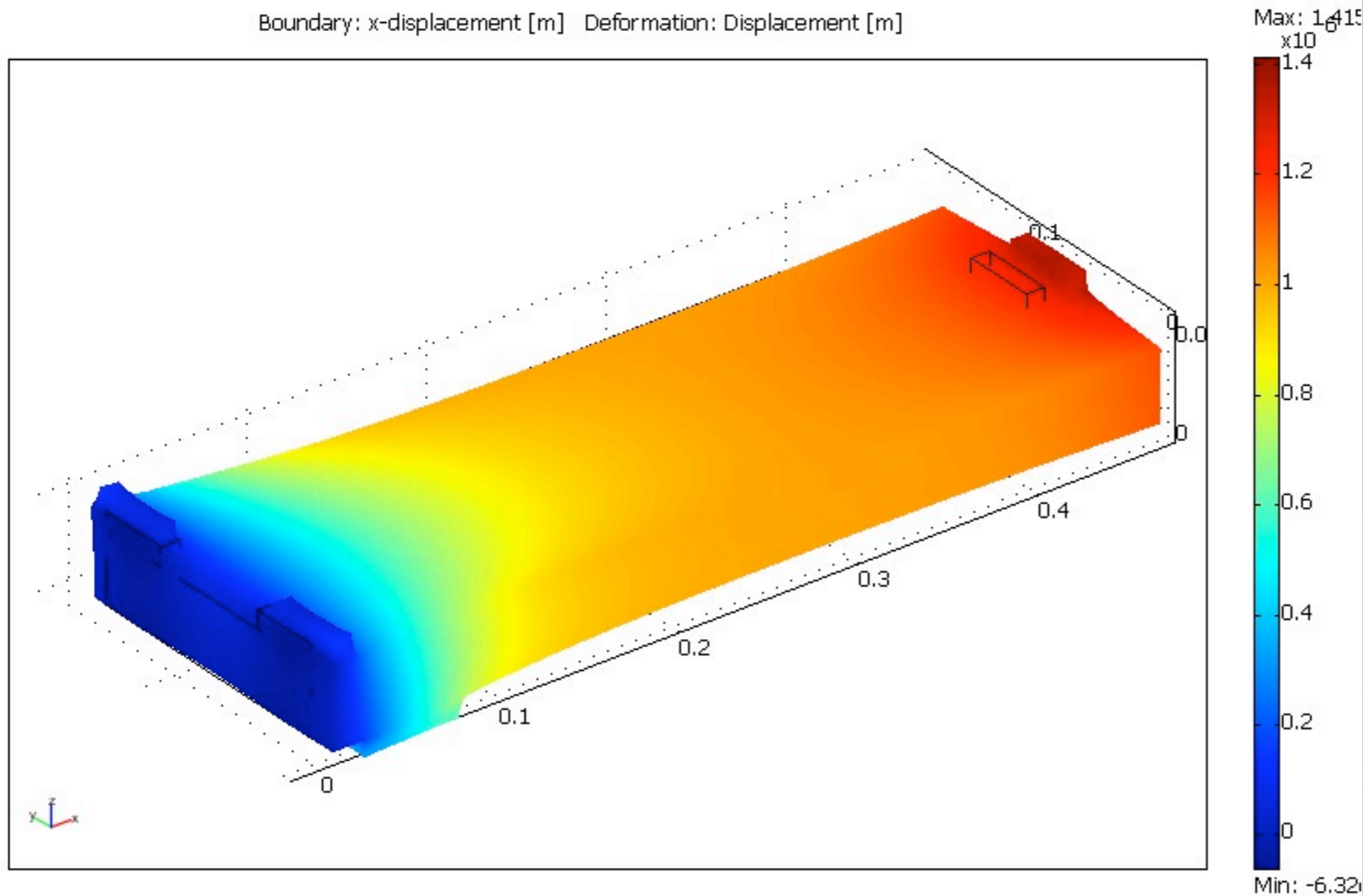
- http://ilog.ligo-wa.caltech.edu:7285/advligo/CAD_drawings



Current Configuration



Thermal Modelling



Displacement
< 2 microns

OMC Status

- REO optics have been ordered (Thanks, Helena)
- RFQs for Breadboard are out and returns are reasonable
- Hermetic PD preamp are ordered
- Test plan for cavity ramping up
- Ready to assemble the prototype when breadboards arrive in June