LIGO Caltech – Virgo LAL Orsay meeting

August 28th, 2006

Status of the collaboration

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LIGO-G060491-00-R

Status of the e2e simulation

e2e simulation:

- **40mInLockState** package → **almost done!**
- **40mInLockSeism** package → **under investigation**
- **AdVirgoFP** package → **done! Can be improved**
- **AdVirgo** package → **under investigation**

Status of the 40m activities

40m commissioning:

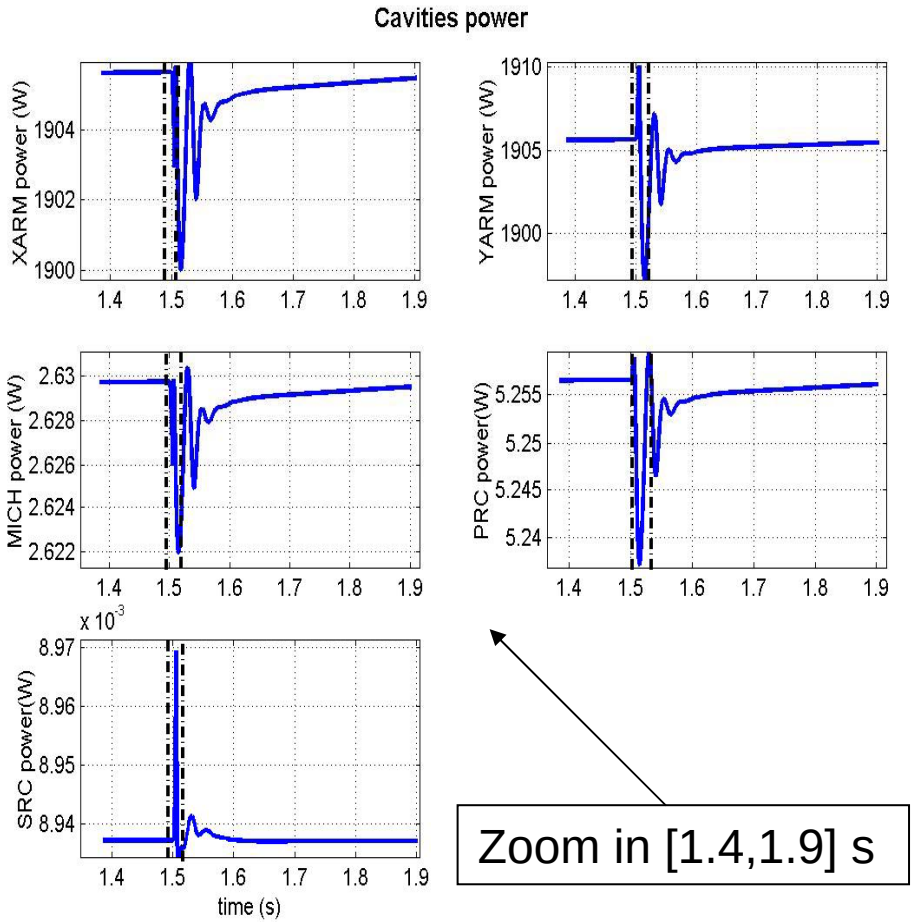
- note on mirror velocity reconstruction → **almost finished**
- note on the Gouy telescope for the MC WFSs → **In progress**
- note on the calibration of the GW signal channel → **In progress**

40mInLockState package

Elimination of the offset on the CARM (POX and POY error signals combination) thanks to the new demod angles determined dithering each end mirror independently.

Lock stable for 7s

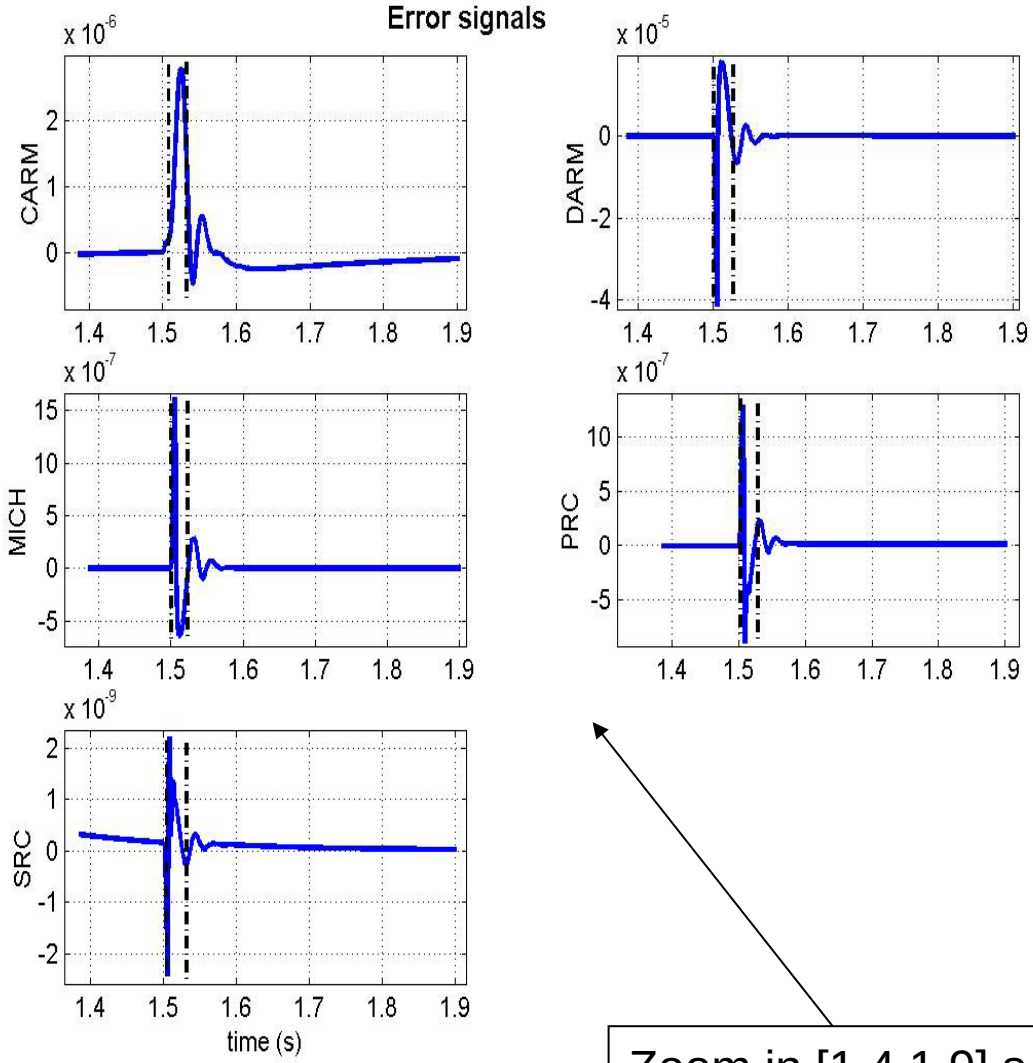
Control system active @ 20ms
Radiaton PressureForce @ 0.1s
Seismic noise injected @ 1s
Open DARM,CARM loops @ 1.5s
Close DARM, CARM loops @ 1.505s



40mInLockState package (2)

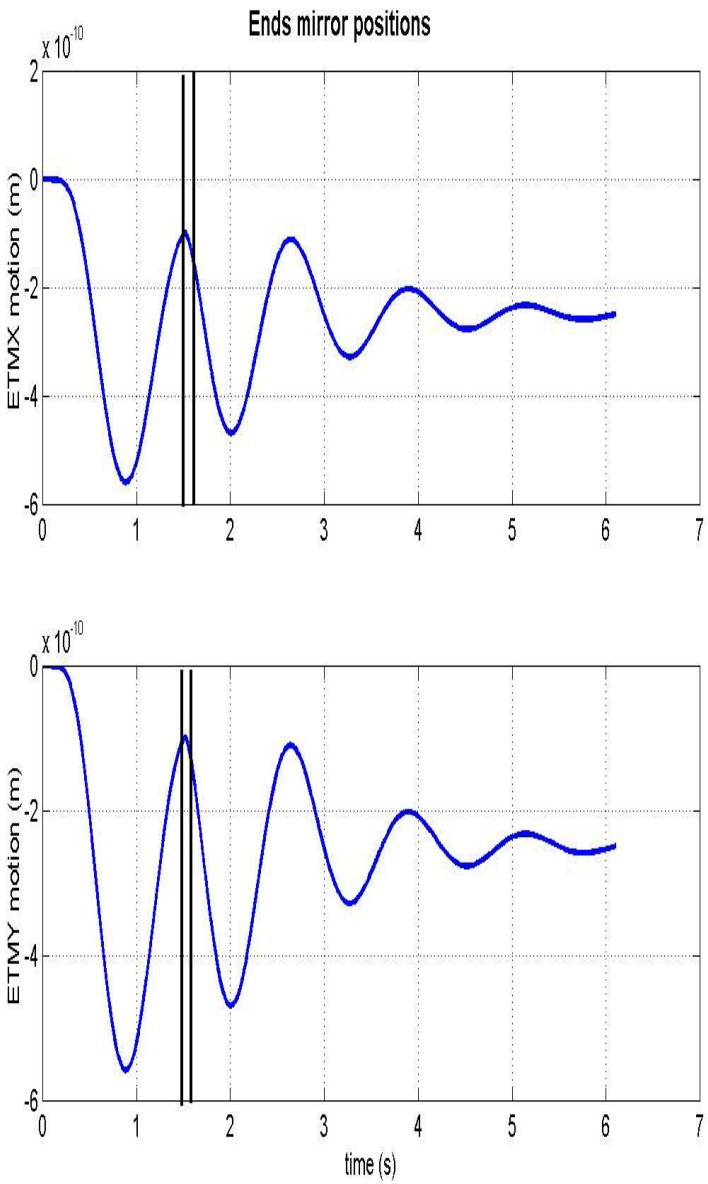
Controlled d.o.f. :

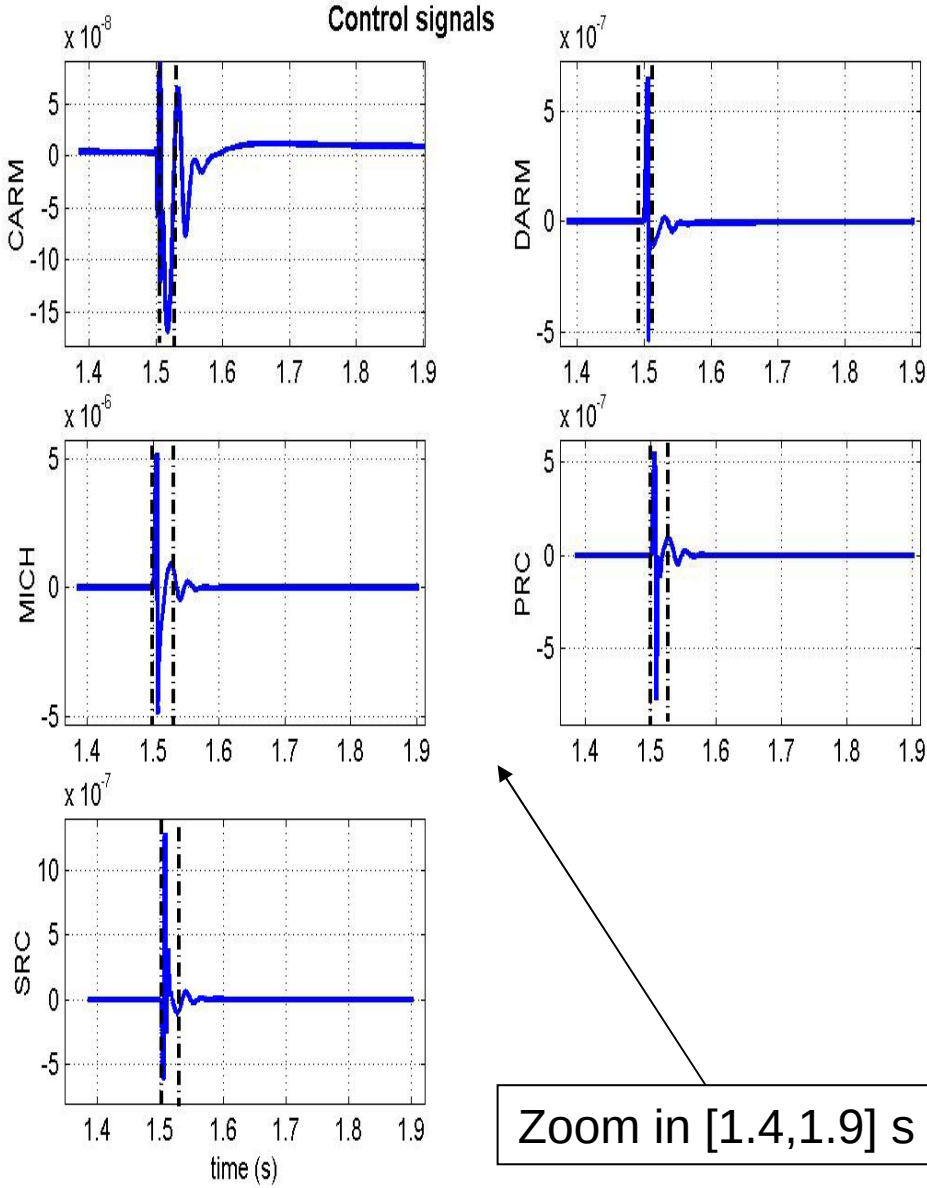
DARM : AP166Q
CARM : POX33I+POY33I
MICH : AP33I
PRC : SP133I
SRC : POX199I



Zoom in [1.4,1.9] s

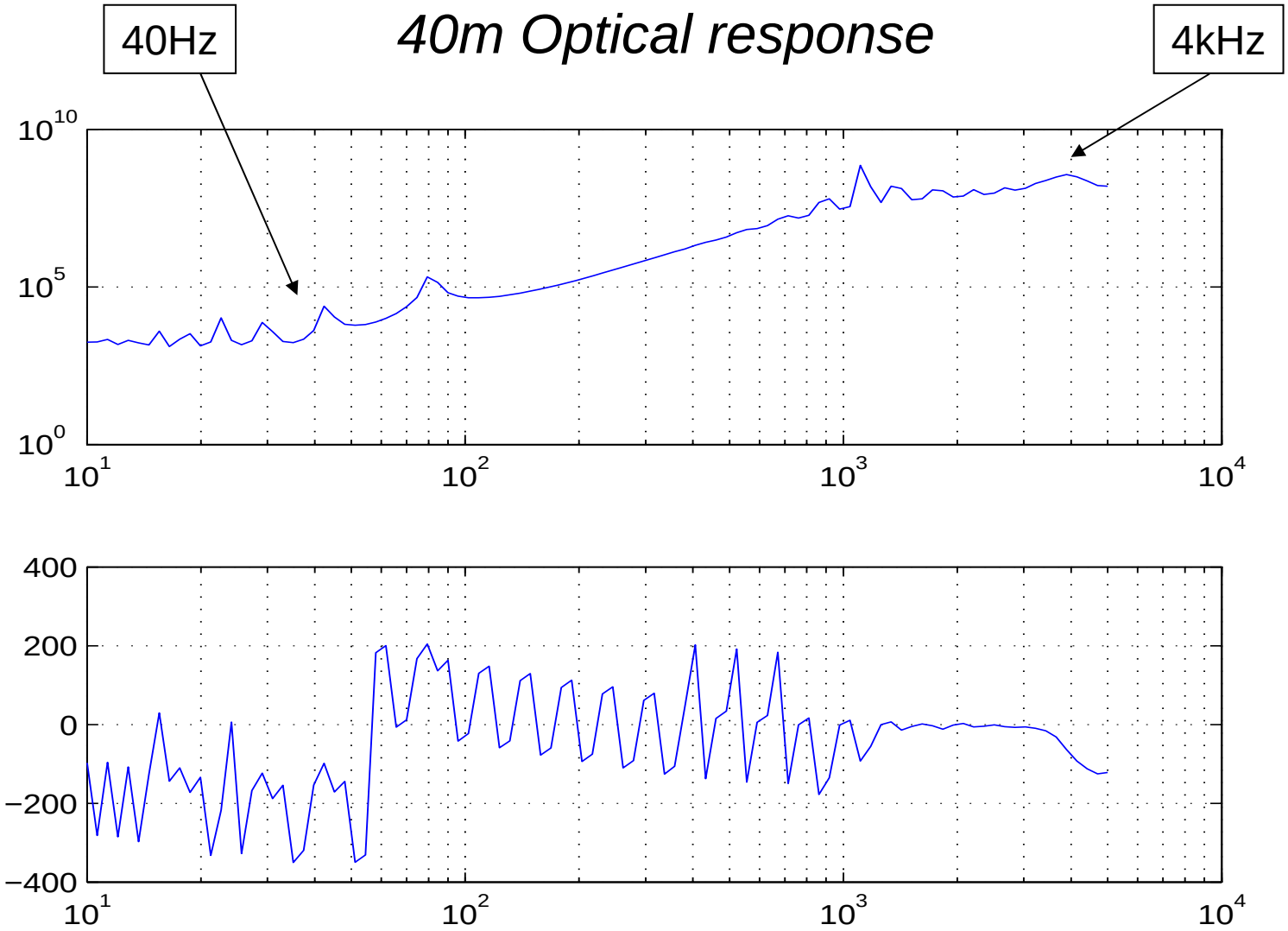
40mInLockState package (3)





Zoom in [1.4,1.9] s

40mInLockState package (4)

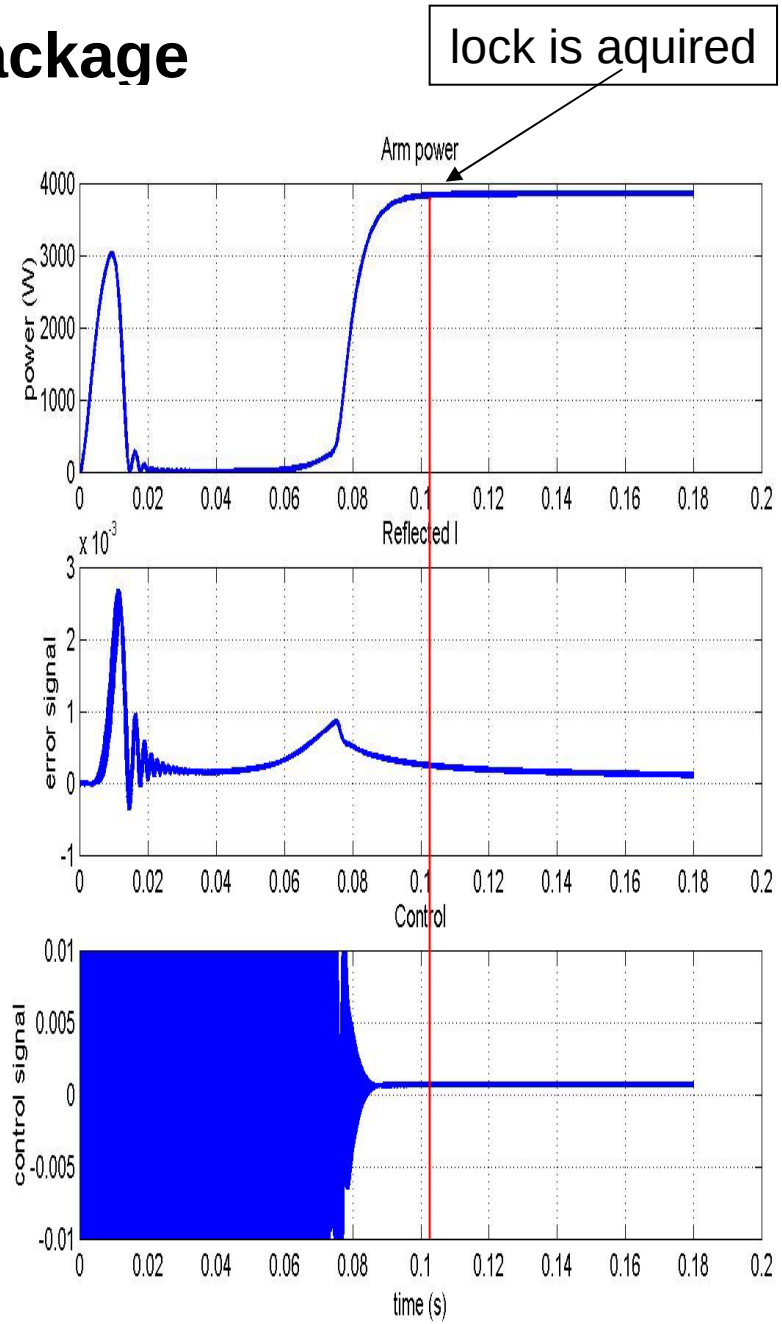


AdVirgoFP package

Power = 20W
Demod freq = 6.26 MHz
Arm lemgth = 3km
$T_{itm}=T_{etm}= 0.005$
$L_{itm}=L_{etm} = 50ppm$
Radiation pressure on ITM and ETM
Cavity controlled with REFL_I
Lock acquired at 0.1s

It is not possible to lock with a laser power of more than 20 W

Strategies to increase the power after acquiring the lock at low power are under investigation.

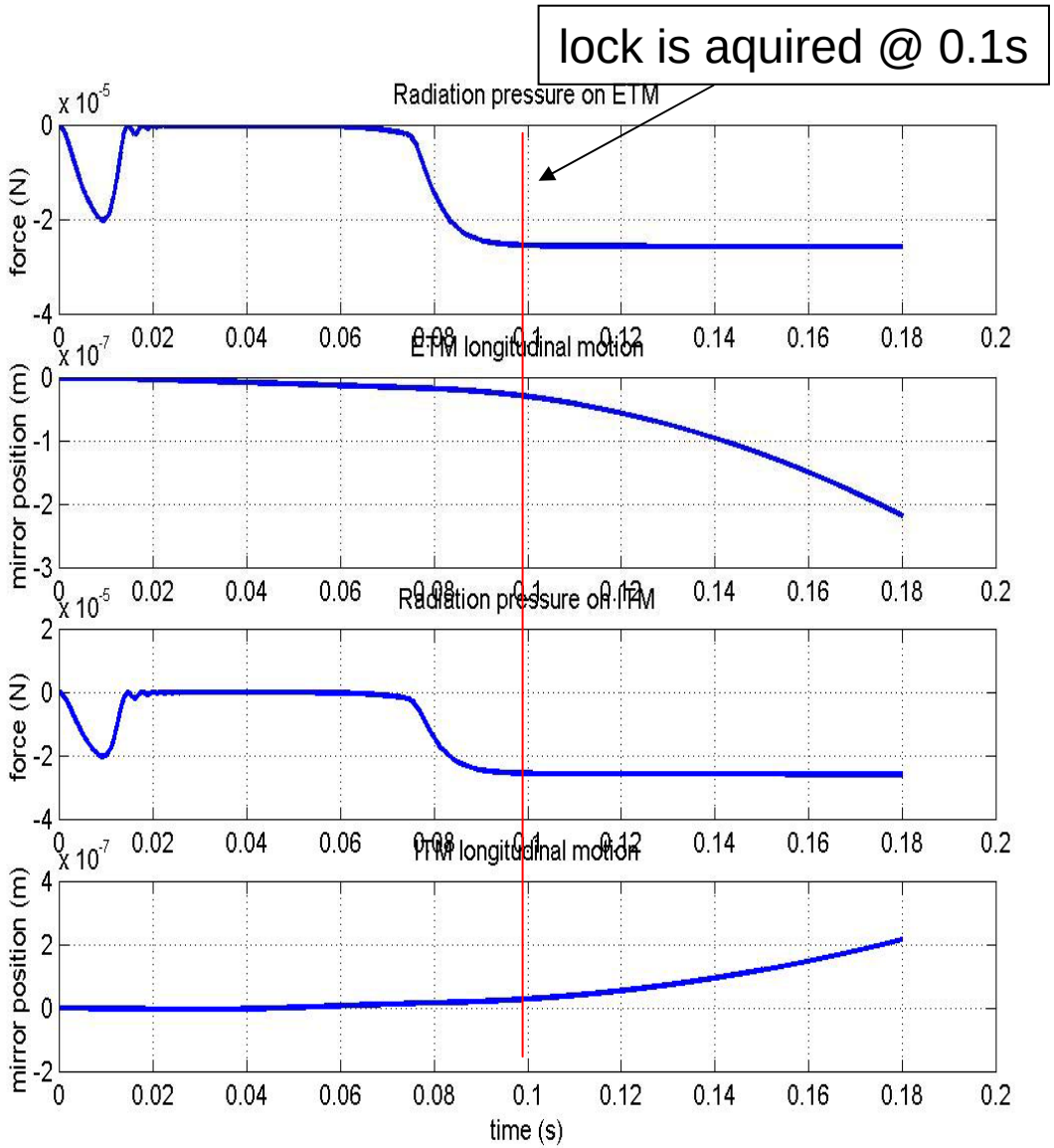


AdVirgoFP package (2)

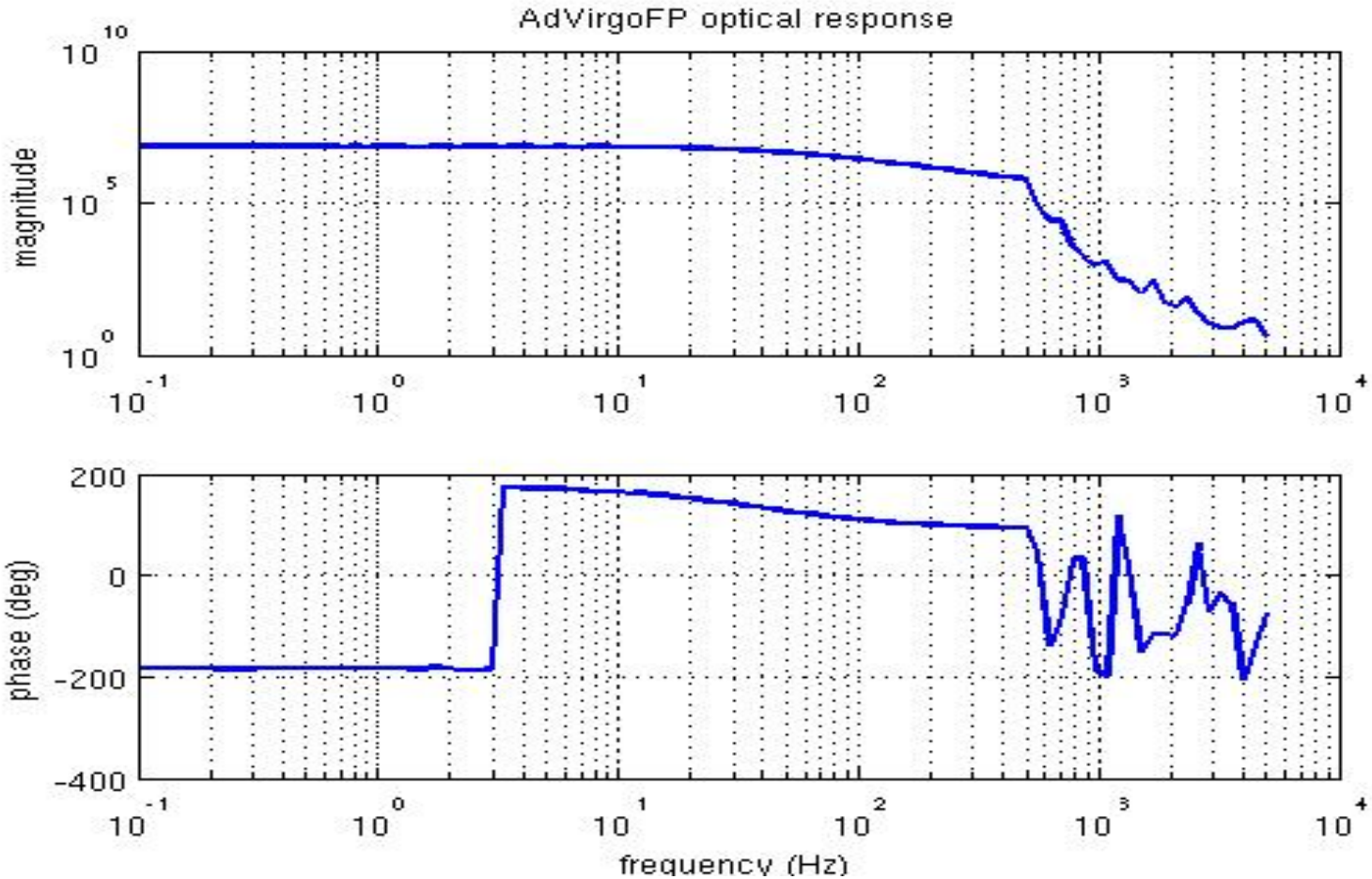
Control system:
The cavity can be controlled also using the TRANS_I error signal when it is not too small

Suspension:
simple pendulum up to now

Seismic Noise:
10^-6 m/root(Hz)



AdVirgoFP package (3)

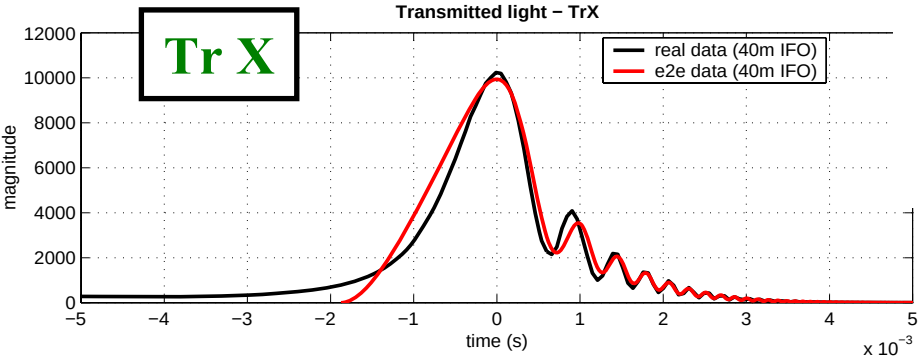


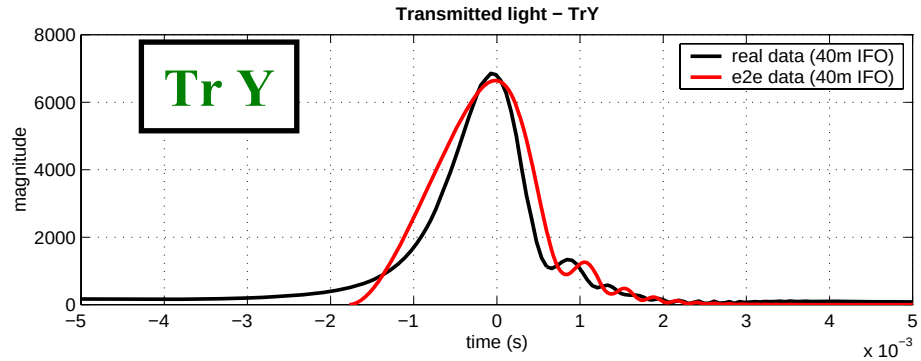
Mirror velocities reconstruction

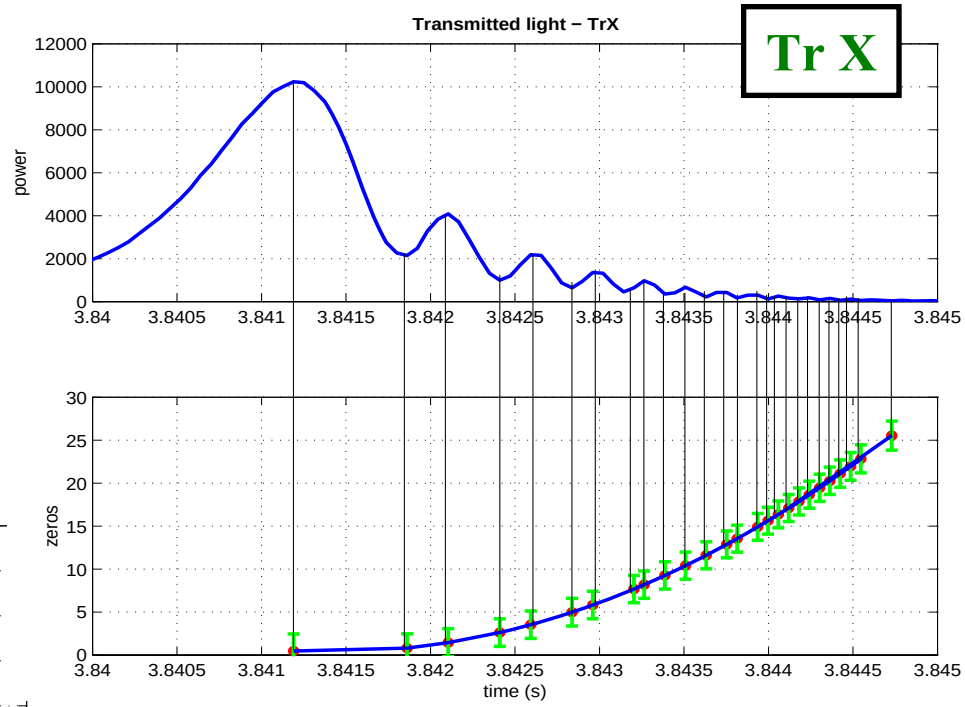
Real data have been used to estimate relative mirror velocity for both the arms:

$V_{xarm} = (0.35 \pm 0.13)$ µm/s

$V_{yarm} = (0.26 \pm 0.13)$ µm/s

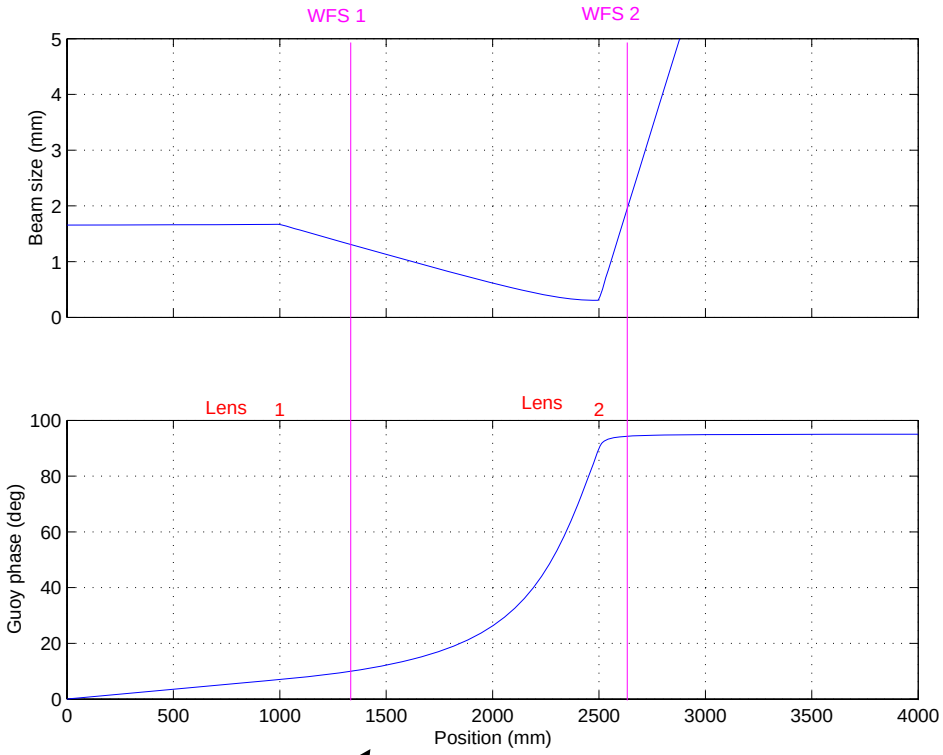






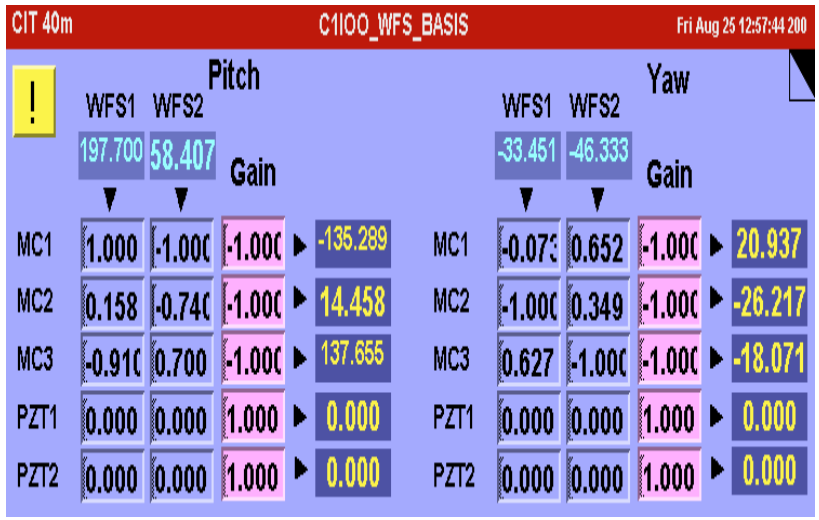
Comparison between real data (black) and e2e simulated data (red) of the transmitted light for both the arms: the mirror velocities used in e2e simulation are the values obtained fitting the real data

Design of a new Gouy telescope for the MC WFS



Beam code to determine the lenses and the WFS positions

WFS output matrix after diagonalization



What’s next?

- Future of the collaboration on the Signal Recycling
- AdVirgo with or without SR option (white paper)
- Notes
- Questions, Comments, Discussion