



Status of the eLISA on table (LOT) electro-optical simulator for space based gravitational observatories

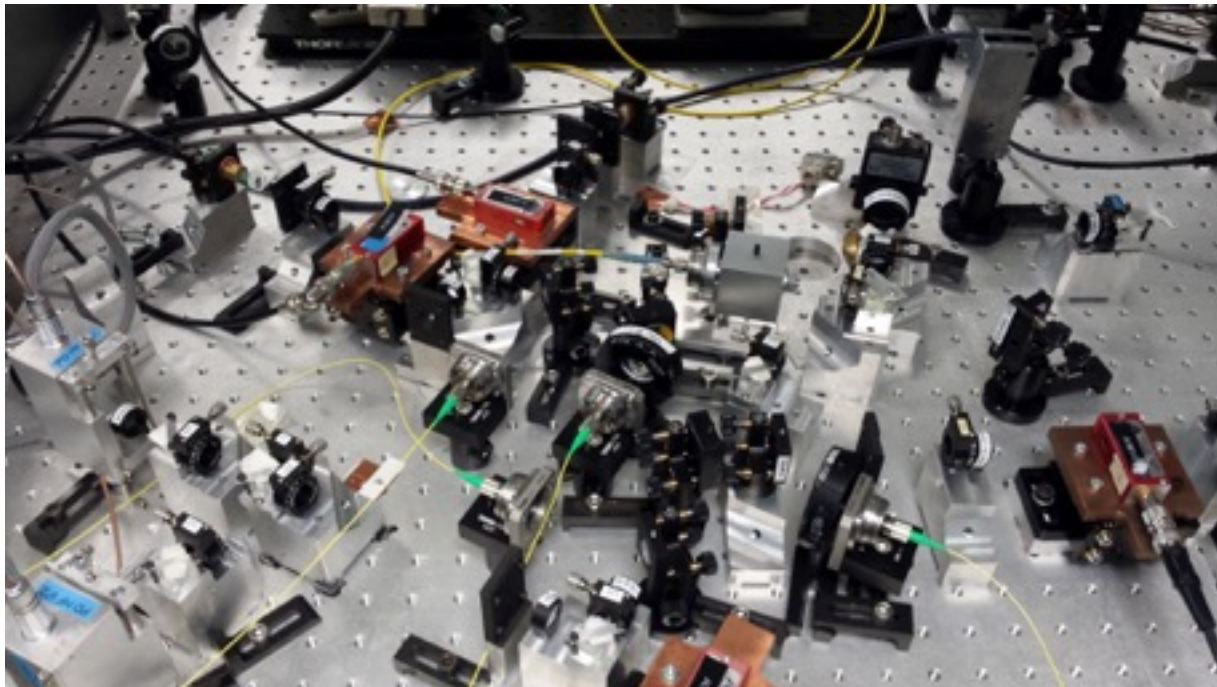
Matthieu Laporte

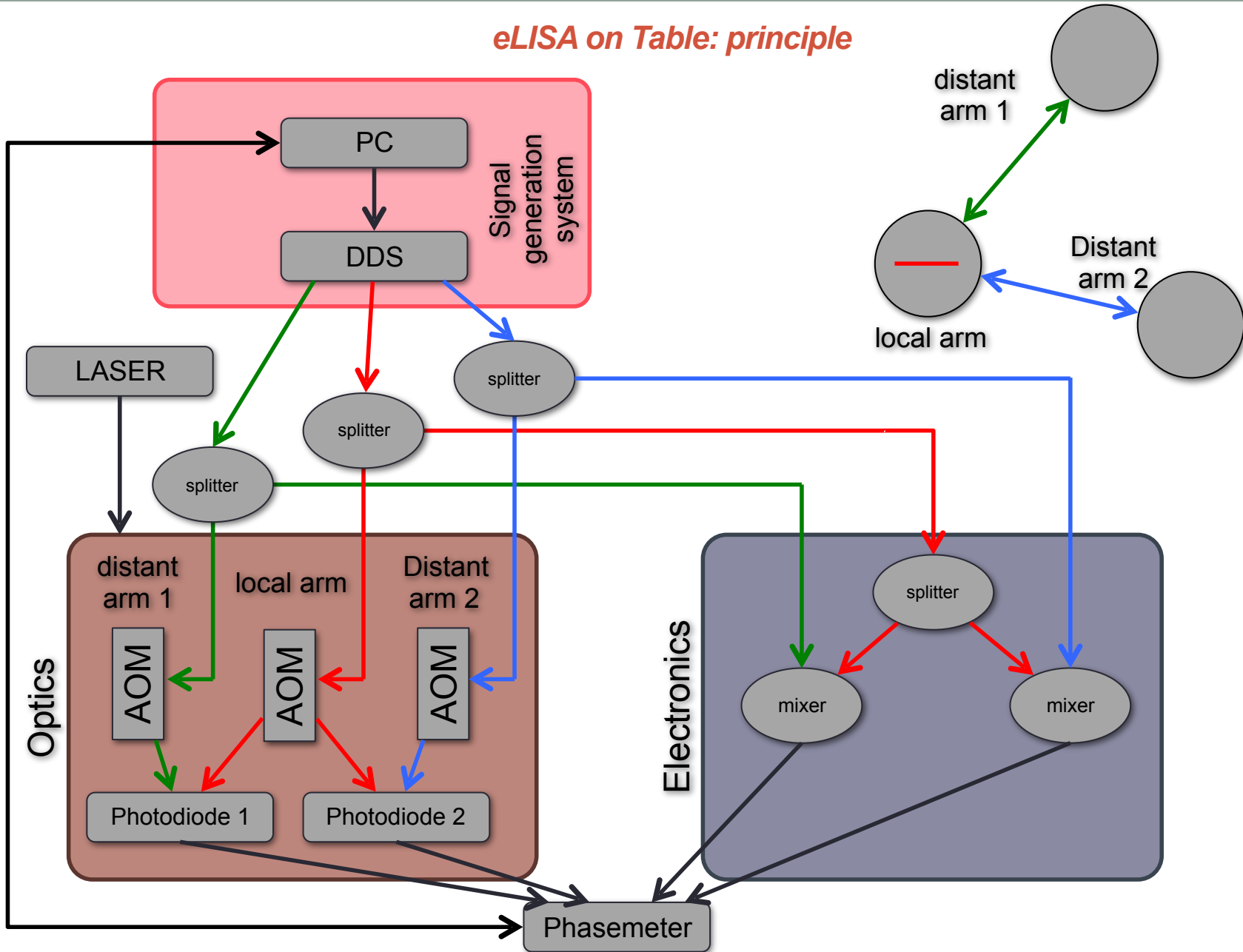
AstroParticule et Cosmologie – APC

Université Paris Diderot

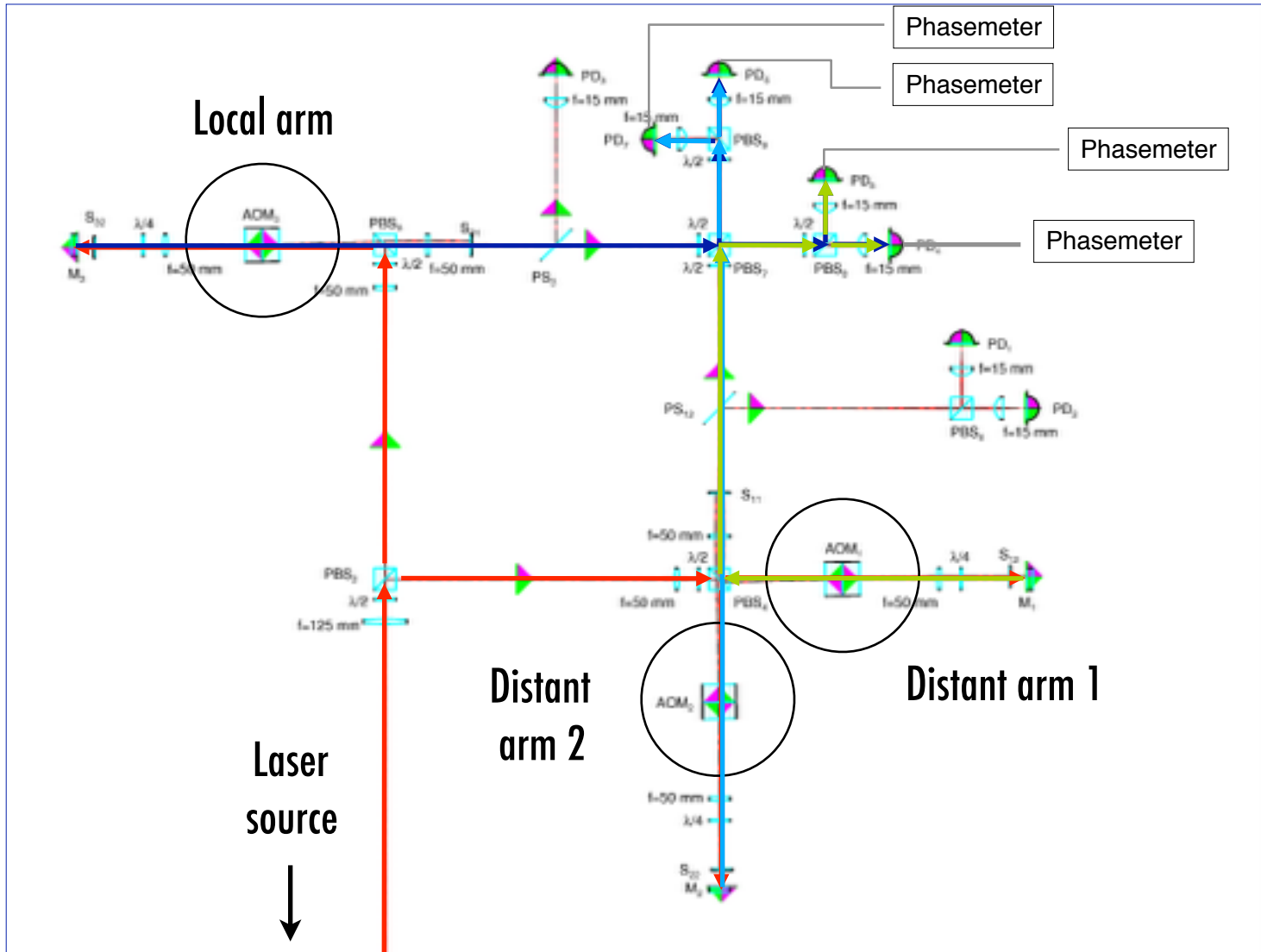
eLISA on Table

- Optical and electronic simulator of eLISA.
- Objectives: to test the noise reduction techniques experimentally, to test instruments (photodiodes, phasemeter, ...) in a representative acquisition chain.



eLISA on Table: principle

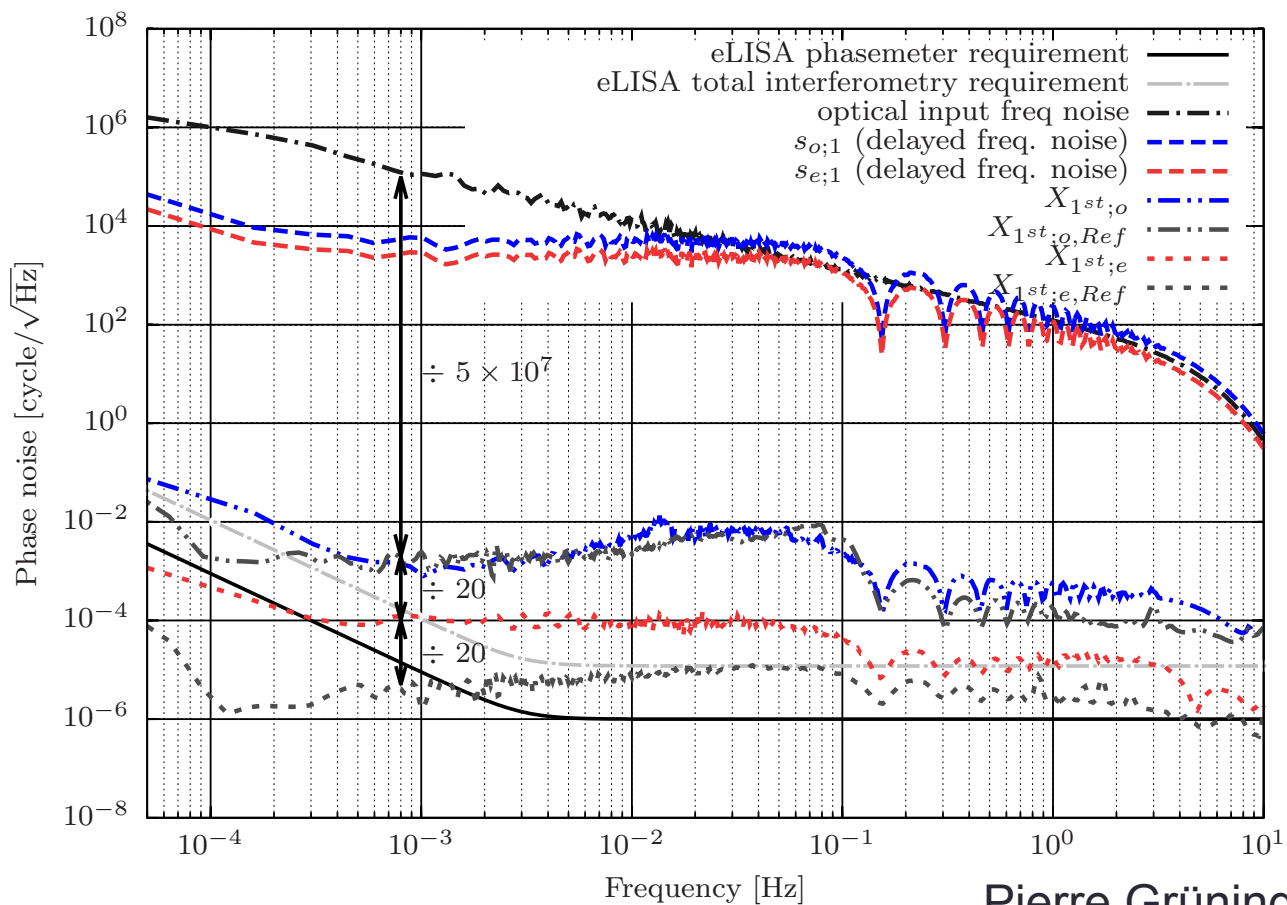
eLISA on Table: optical layout



eLISA on Table: latest results

Latest results for both interferometers in the following configuration:

- TDI 1st generation,
- static, uneven arms,
- white noise.



Pierre Grüning

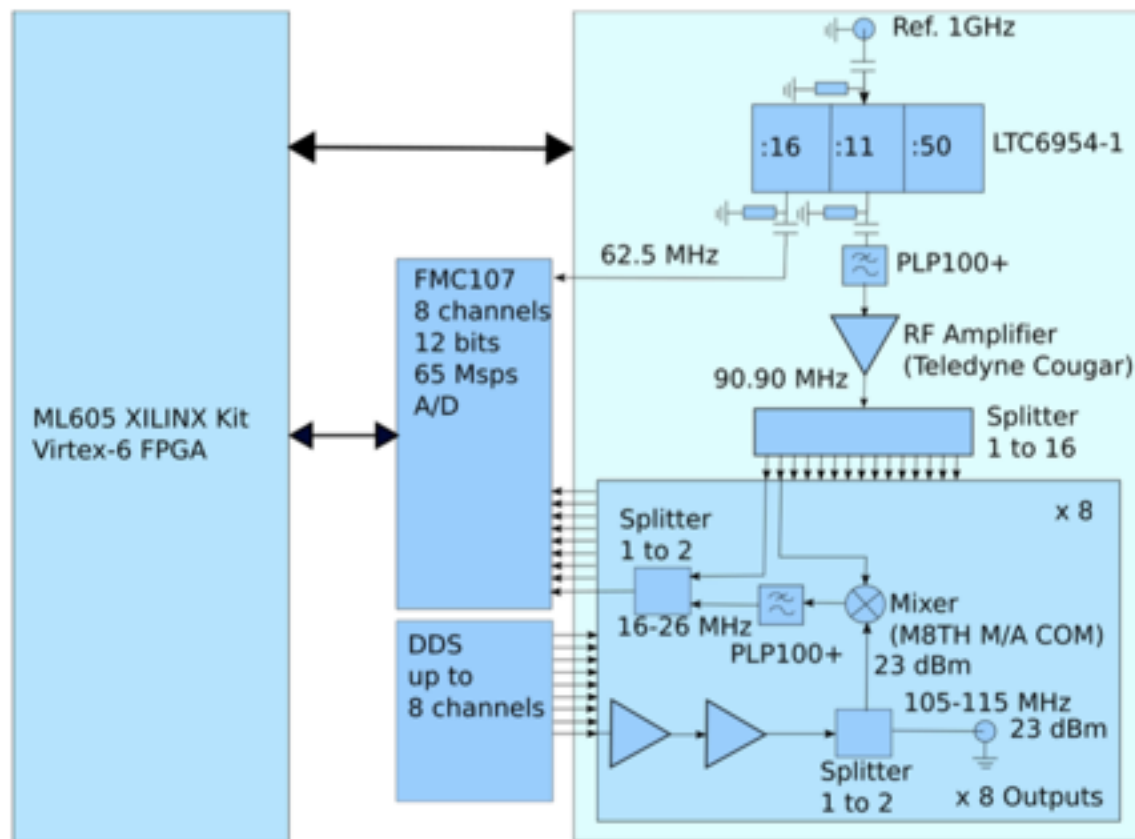
eLISA on Table: limiting factors

Electronic interferometer:

There is still a residual noise.
It is probably due to jitter
between
the DDS channels.

On-going work:

Control loop on the DDS.



eLISA on Table: limiting factors

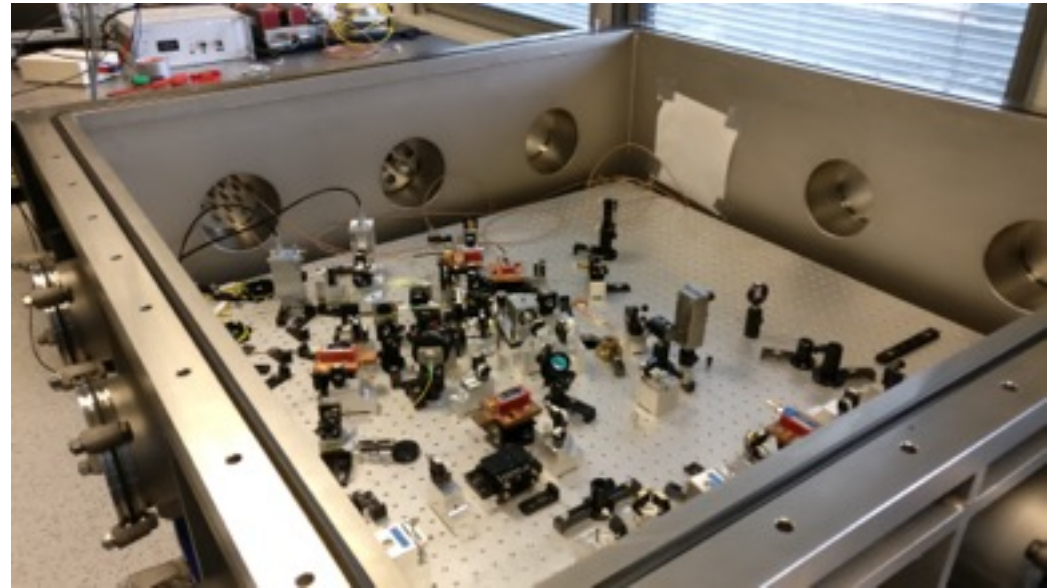
Optical interferometer:

Only limited by the system, which means TDI works in this case.

On-going work:

- More effective active compensation
- LOT in vacuum: ready !

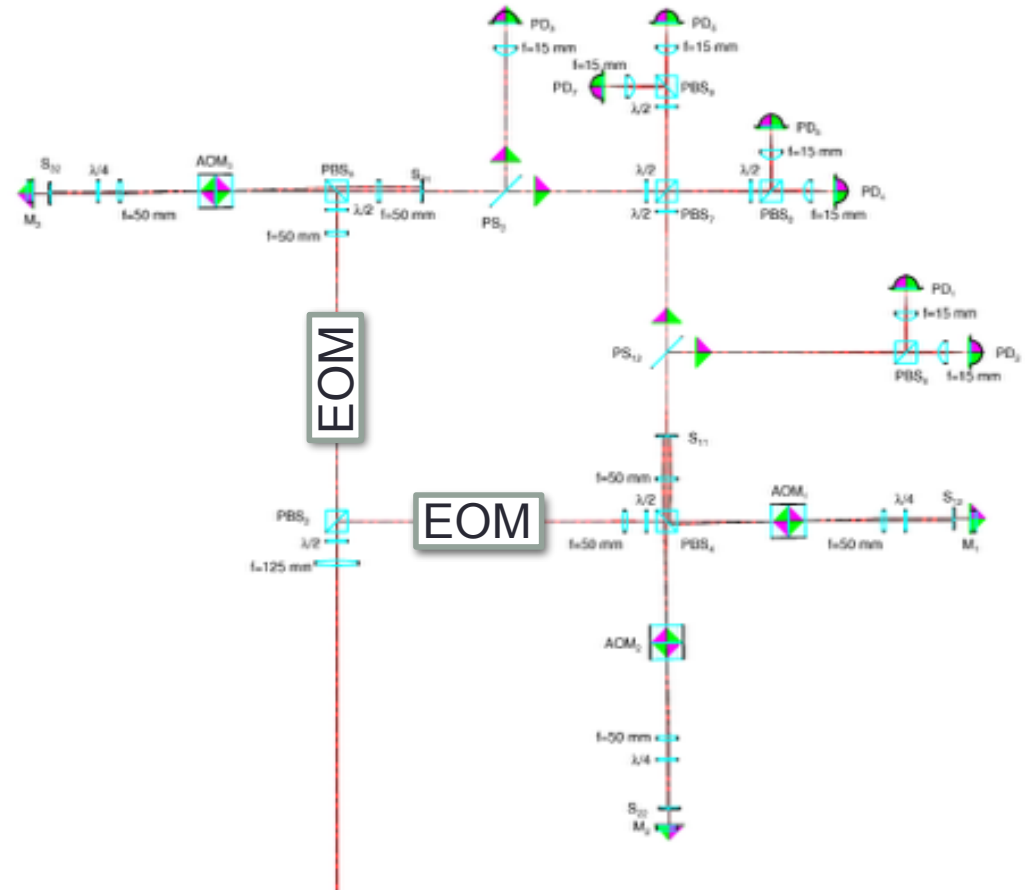
Preliminary studies let expect 1 order of magnitude of noise reduction.



eLISA on Table: what next ?

- Operating the LOT in vacuum.
- New simulations:
 - A. Doppler effect
 - B. Clock noise transfers

Two electro-optical modulators (EOM) have been added to perform the latter.

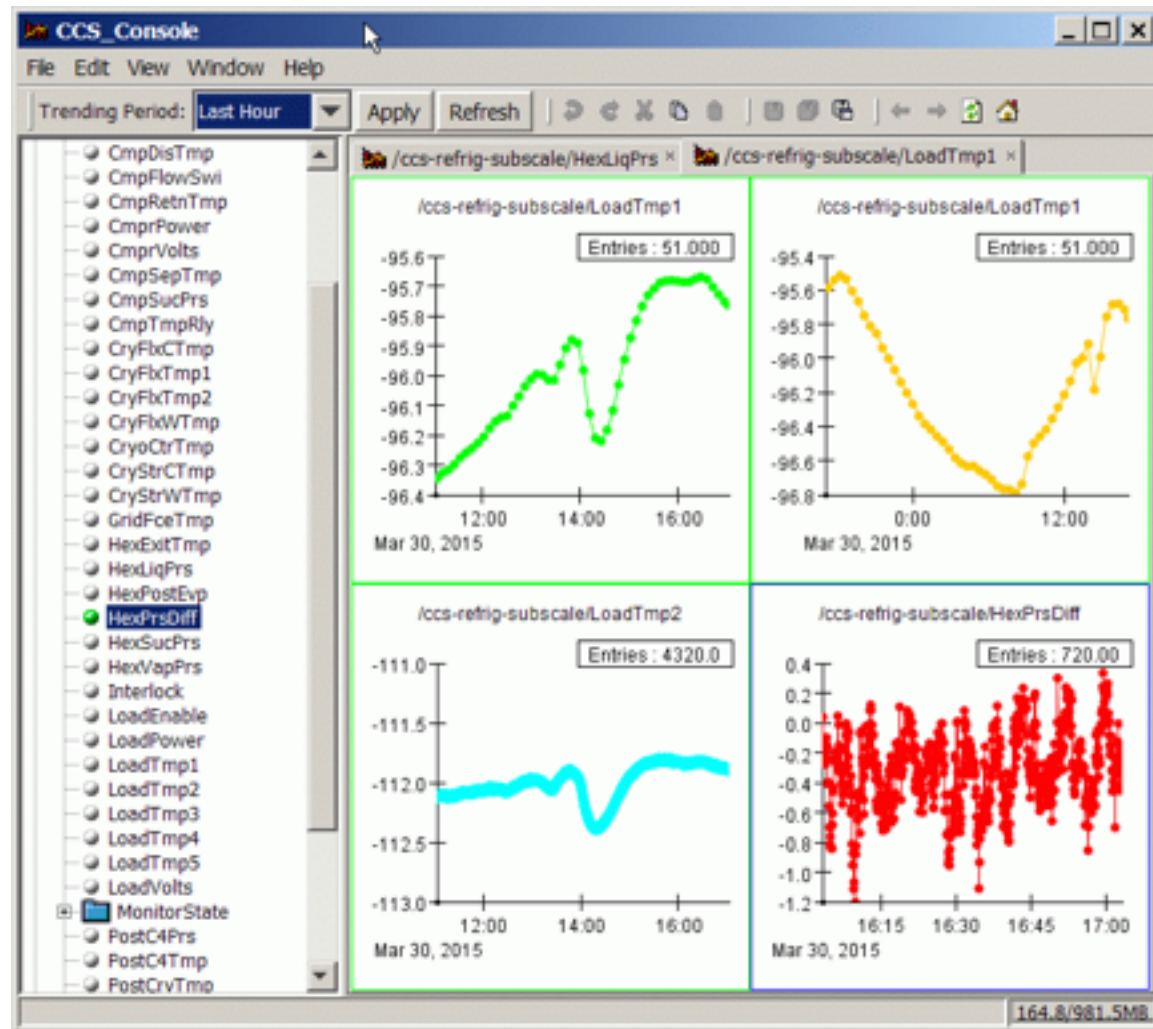


Acquisition system

An acquisition system is developed at APC. It has the same structure as the system of LSST (CCS).

It will allow to save, to consult and to monitor all the signals from the LOT, or from any other system.

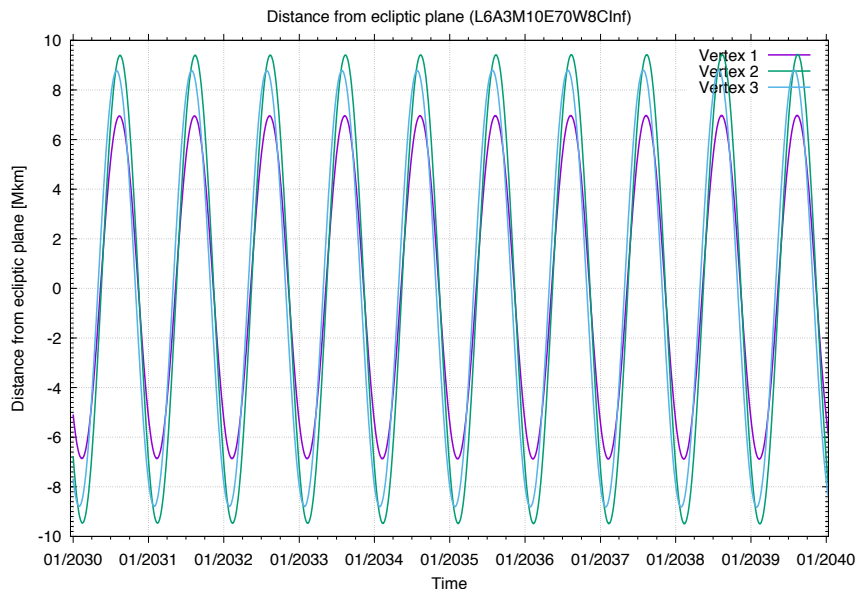
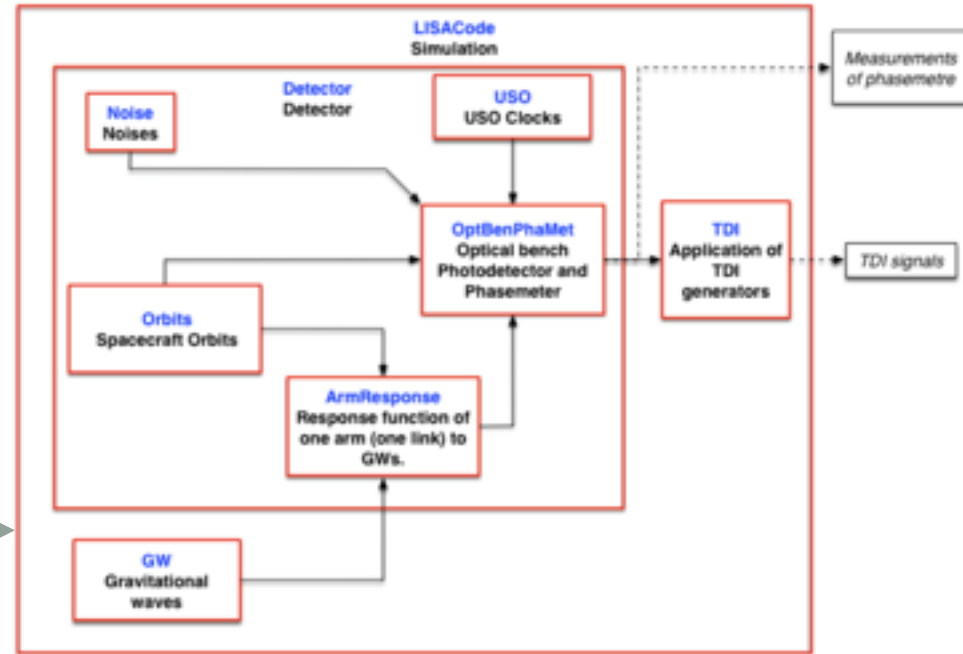
It is already used to monitor the temperature in the vacuum chamber.



eLISA on table and end to end simulations

The LOT is associated to the effort on *end to end* simulations at APC, represented by (amongst others), LISA code and the work on optimisation of LISA orbits.

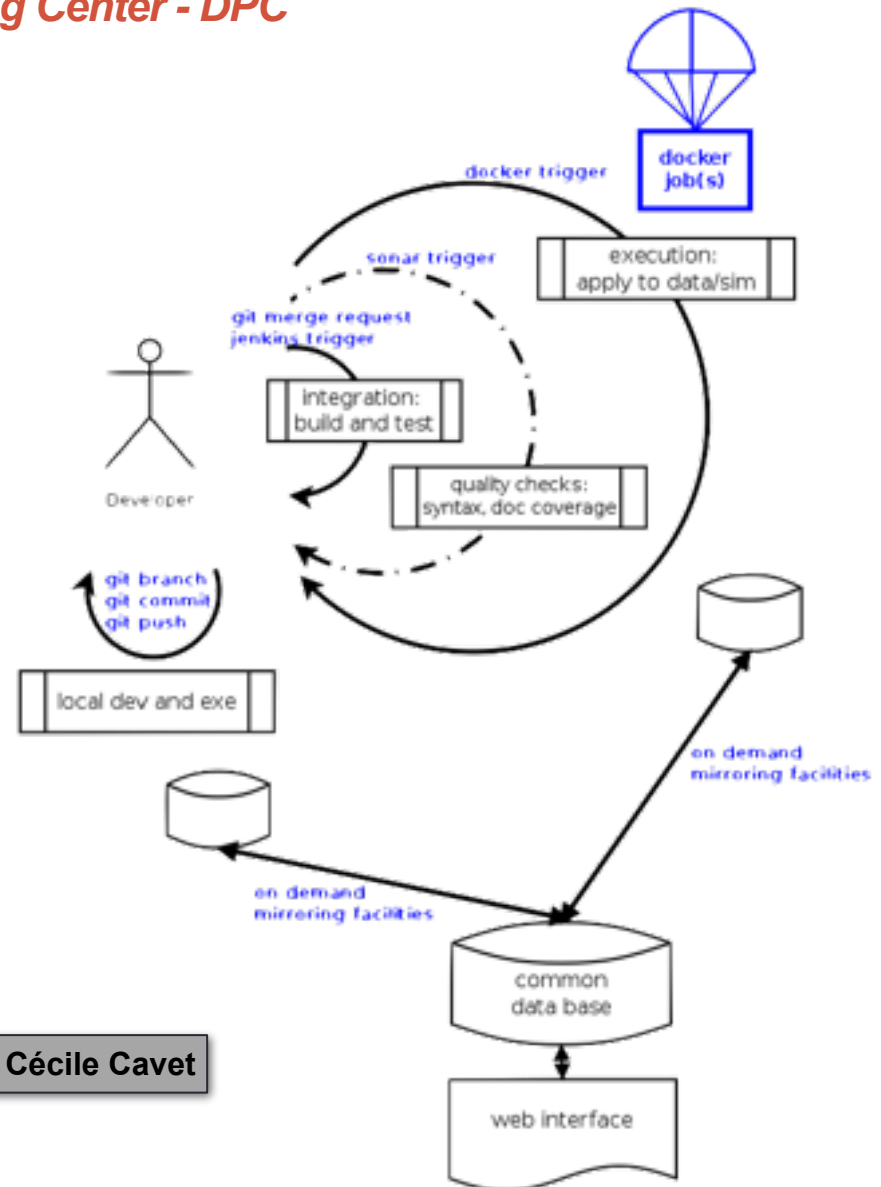
Poster from the simulation working group



Poster from Hubert Halloin

The Data-Processing Center - DPC

All the previously mentioned software tools are to be used through a DPC prototype developed at APC. This proto-DPC aspires to growing bigger: contributions are welcome !



Poster from Cécile Cavet

How to contribute?

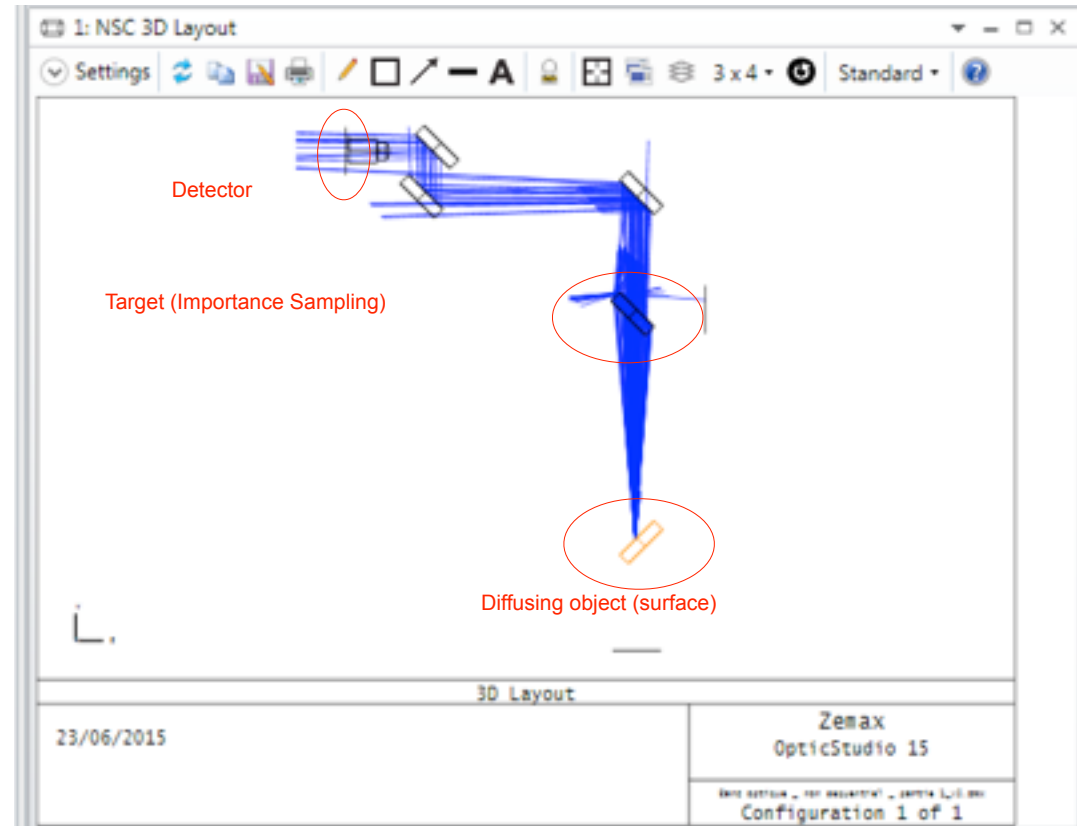
► Open to suggestions /contributions/collaborations:

- DPC platform: <http://elisadpc.in2p3.fr/>
- Create an account on GitLab@CC-IN2P3: <https://gitlab.in2p3.fr>
- Send an email to petiteau at apc.univ-paris7.fr (with your name /email).
- Other projects can be integrated.

Another noise contribution

Another noise contribution is not tested by the LOT nor the other simulators: **stray light**.

A study on that contribution will start this month at APC in collaboration with two other French laboratories: ARTEMIS OCA and LMA.



CONCLUSION

APC focuses on hardware and software simulations of the eLISA system:

- eLISA On Table (LOT): shows that TDI works in simple conditions.
- Participation in *end to end* simulations (LISA Code, orbits optimization).
 - Poster from the simulation working group
 - Poster from Hubert Halloin
- Development of a data acquisition, management and visualisation system.
 - Poster from Etienne Marin-Matholaz
- DPC development.
 - Poster from Cécile Cavet
- Stray light study starting this month.

Thank you!