

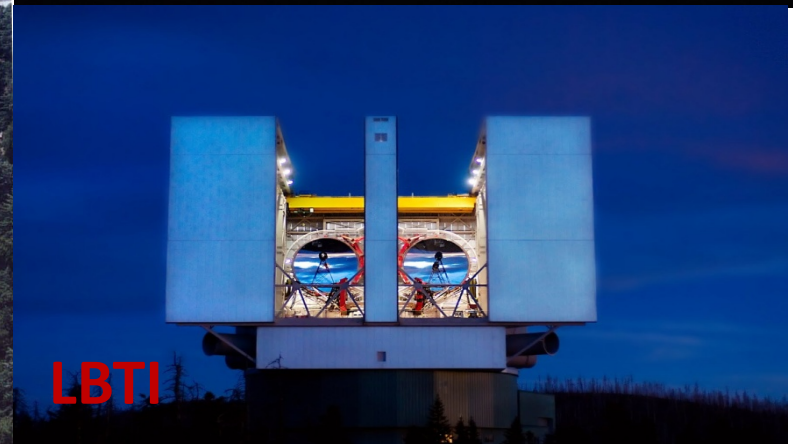
Sky tests of a 10-m baseline

- Carlina prototype

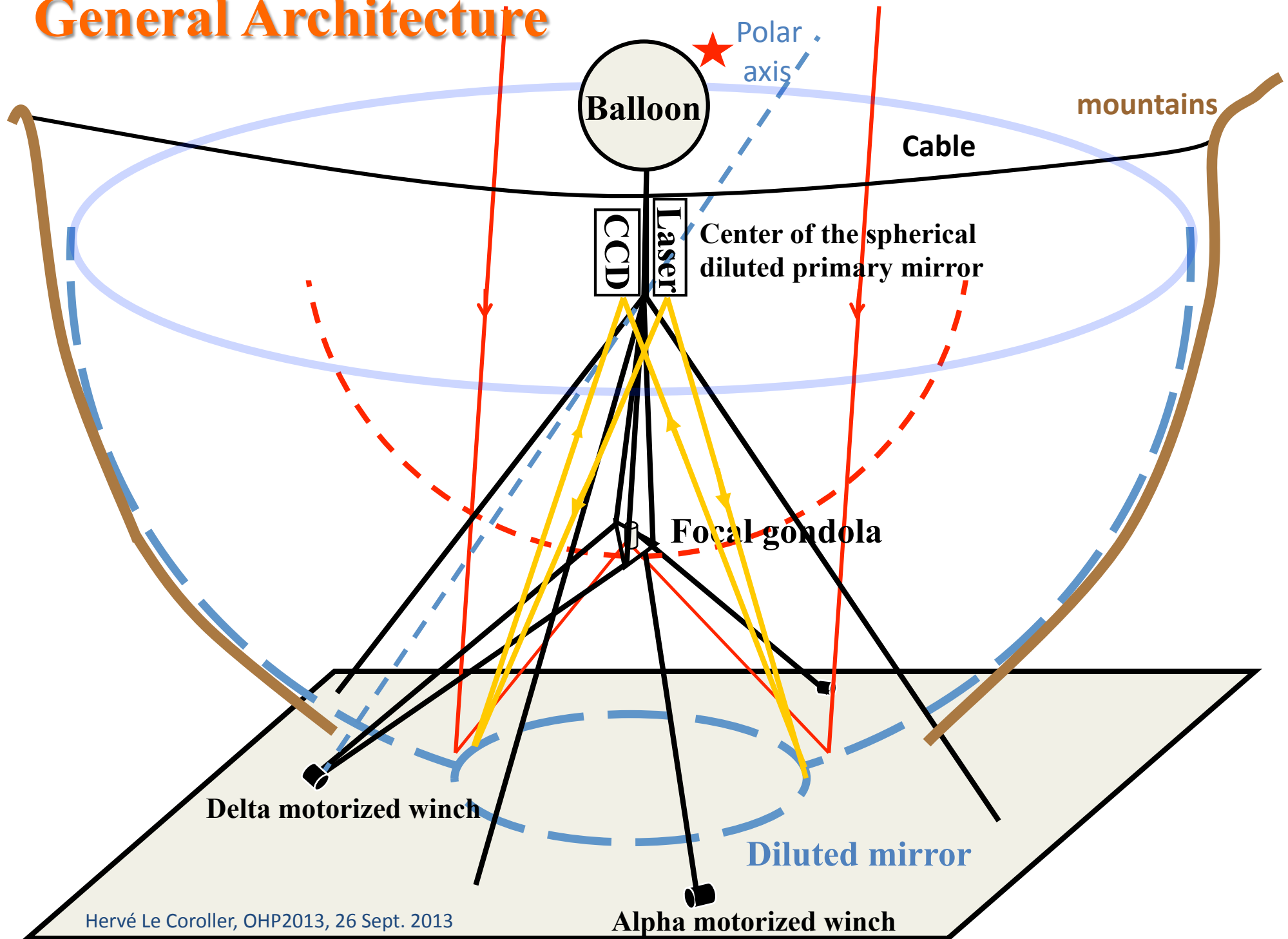
A new class of interferometers:
the Diluted Telescopes

International context

Carlina: a study for the Post-VLTI/E-ELT...



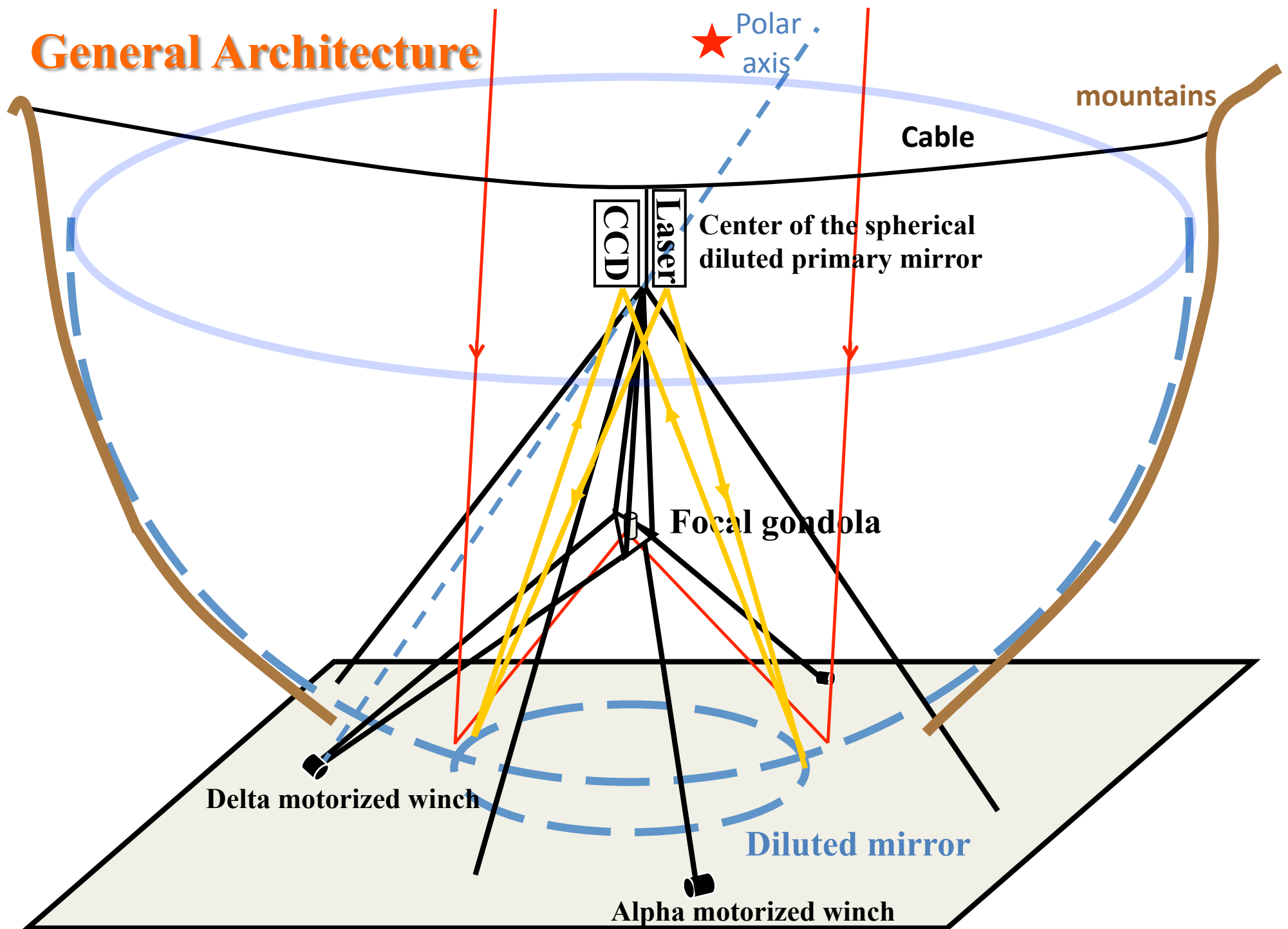
General Architecture



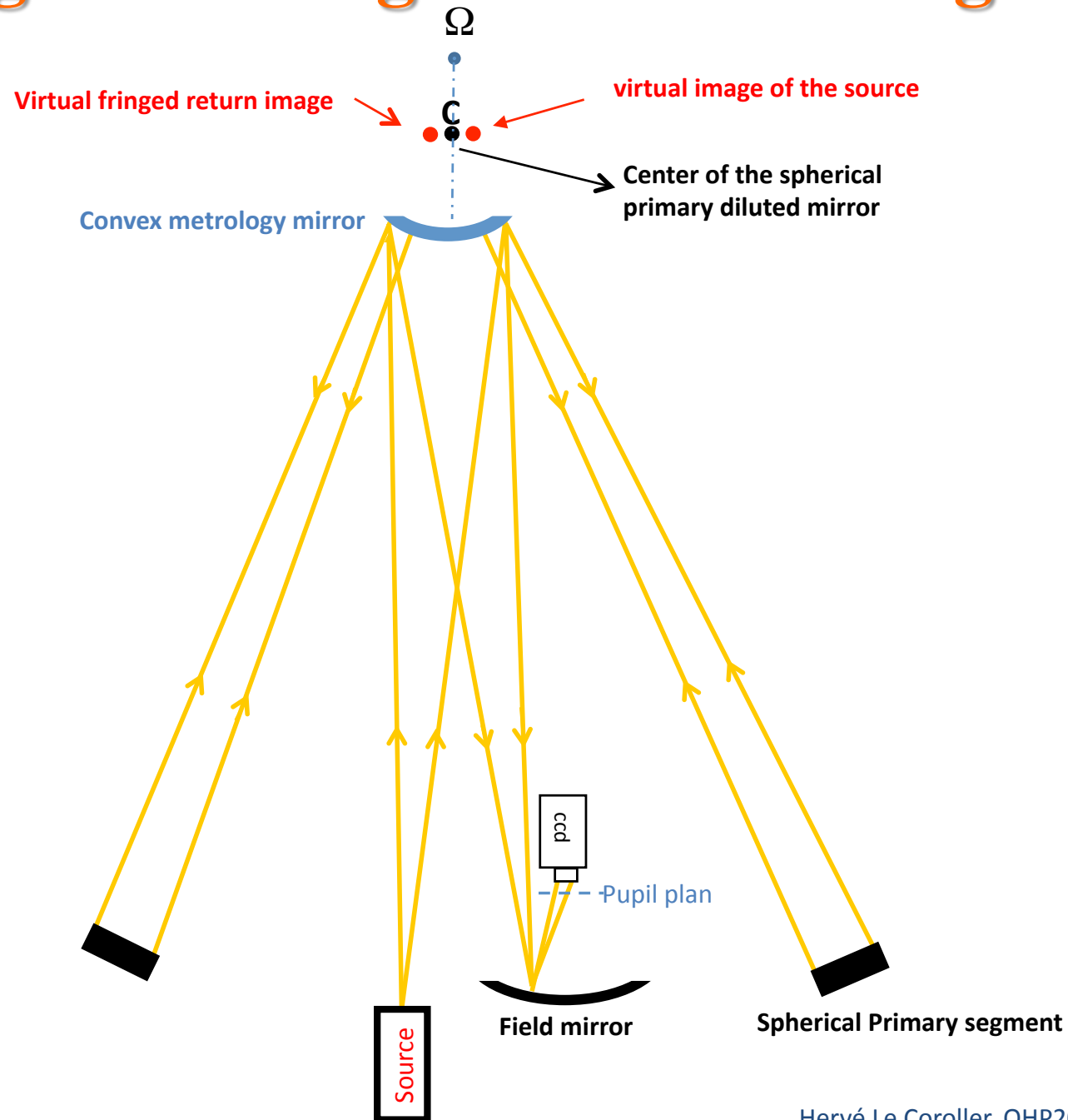
Goal of the Carlina experiment at Haute-Provence Observatory

- I. Find the opto-mechanical solutions to stabilize the gondolas attached under cables, and to be able to record fringes ✓
- II. Measure in real condition the performances of the Carlina interferometer (sensitivity, S/N of the visibilities, etc.)

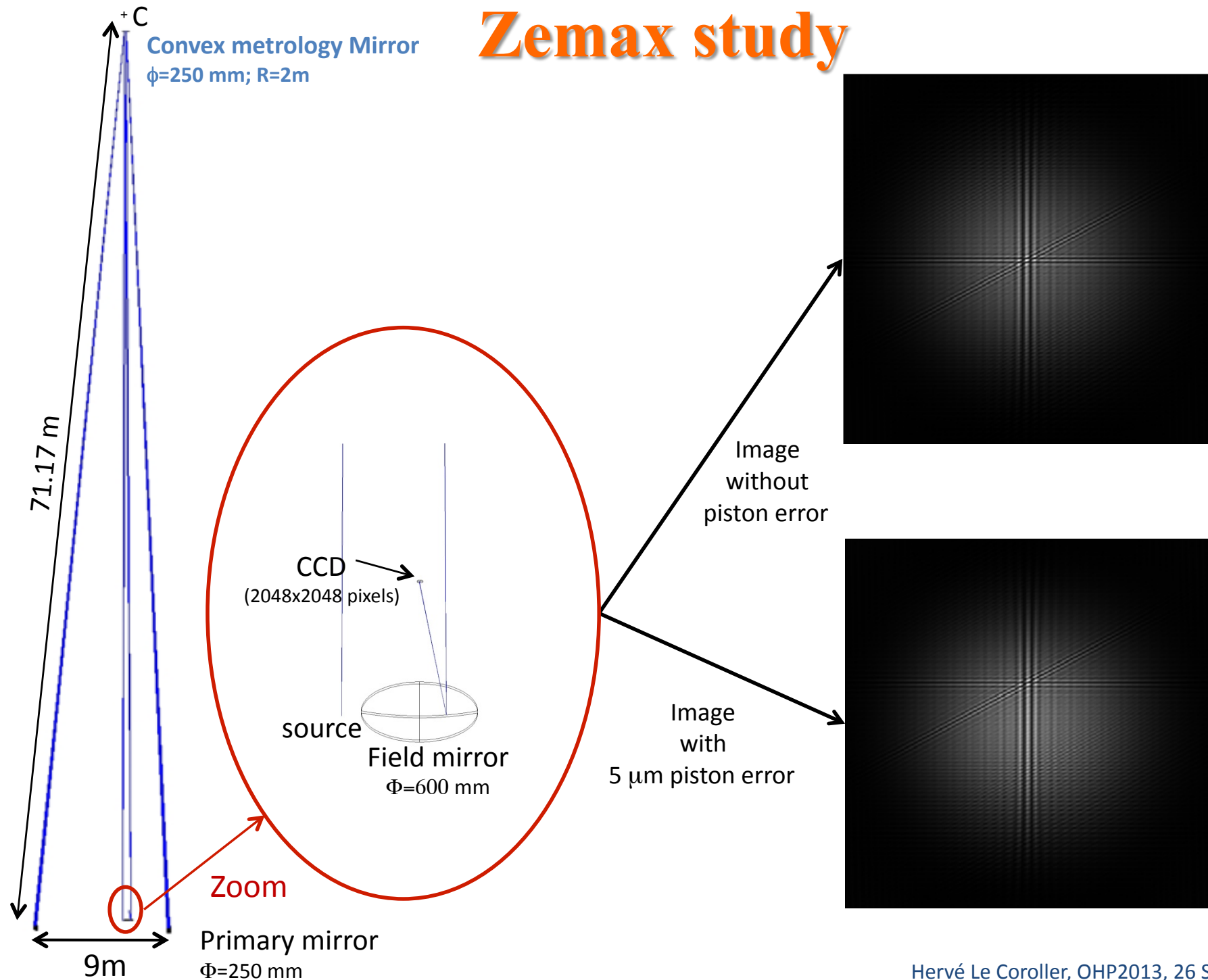
General Architecture



Drawing describing the coherencing technic



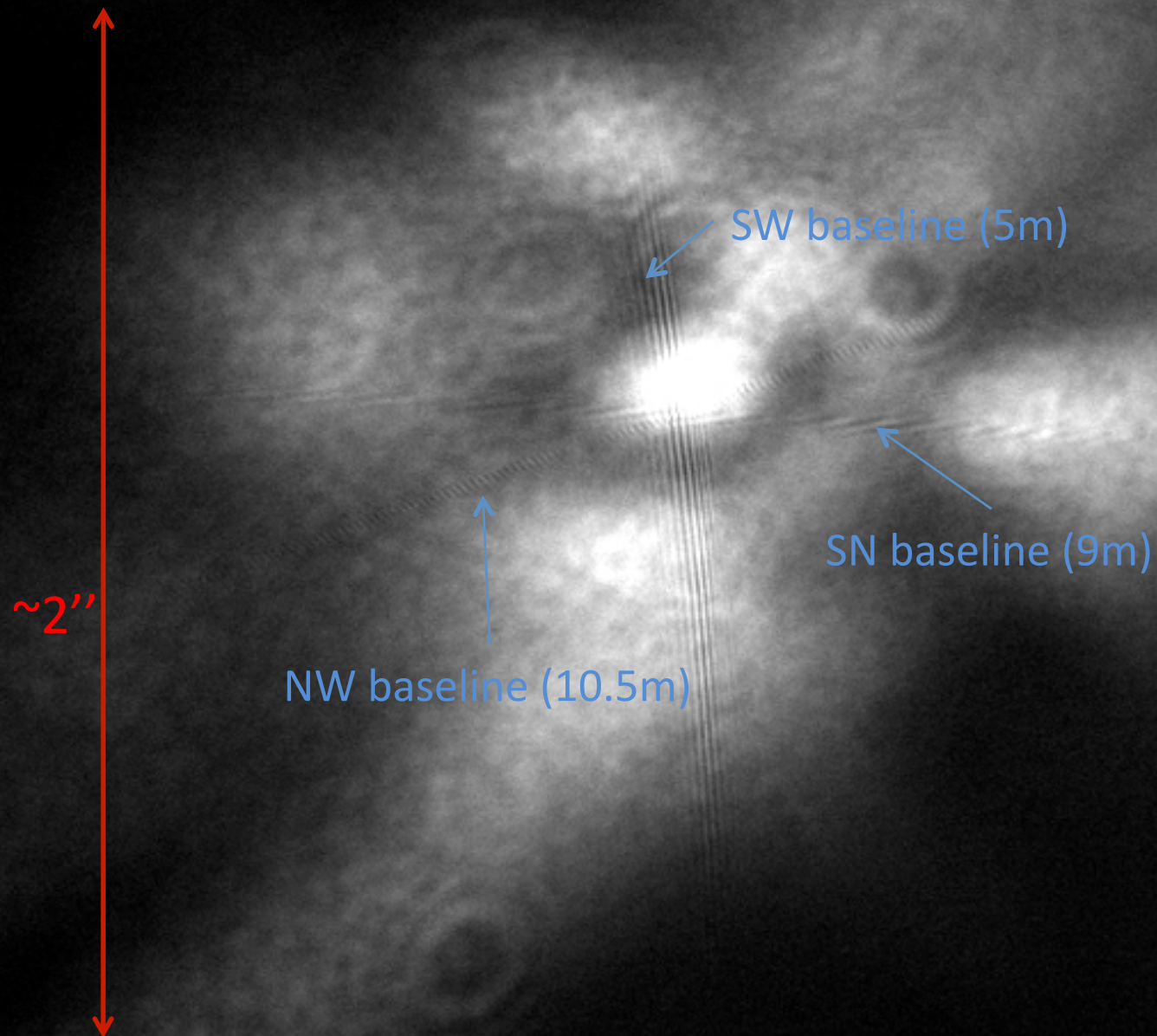
Zemax study



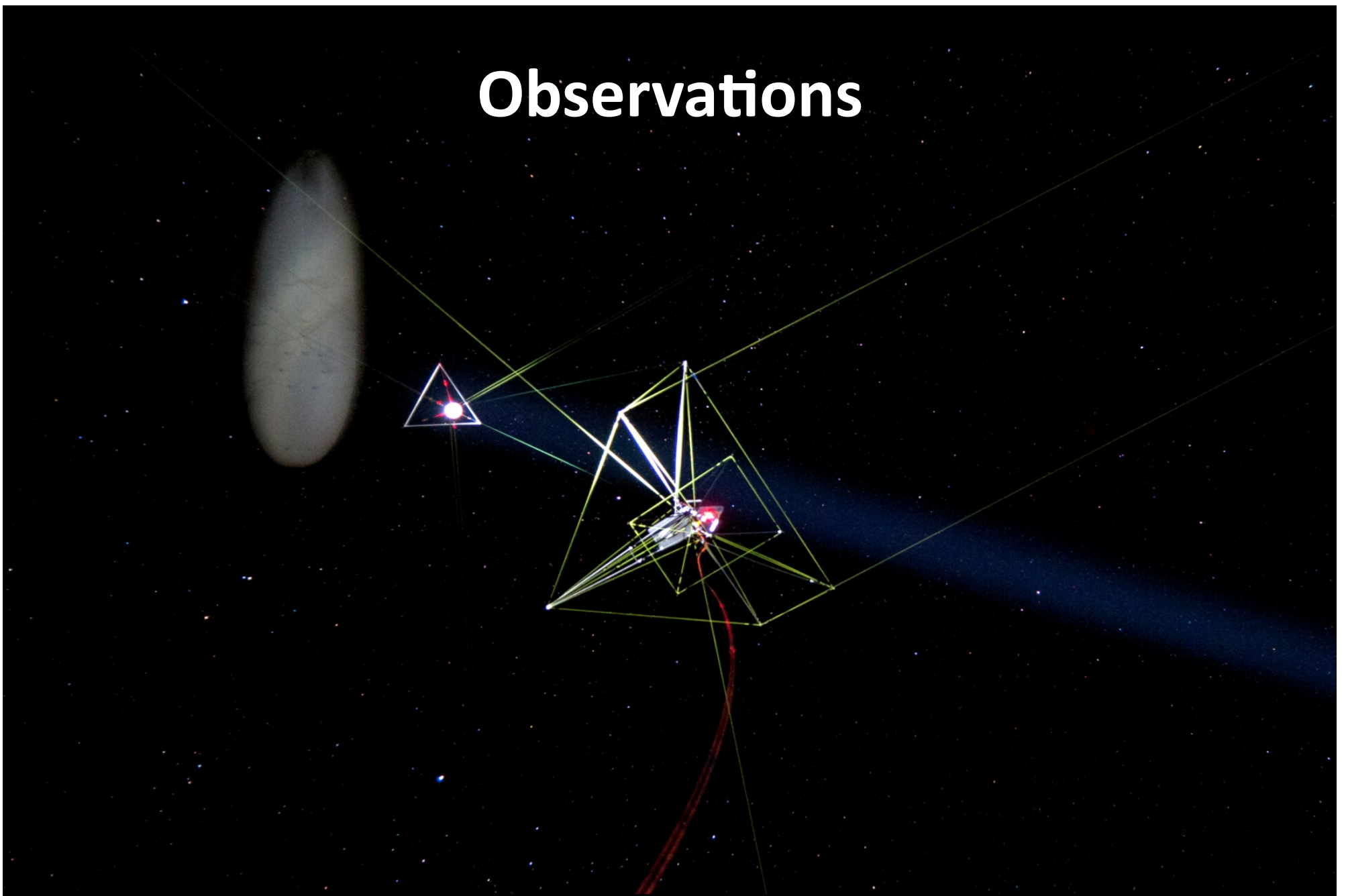
Using a Singular Value Decomposition, we can find a linear equation:

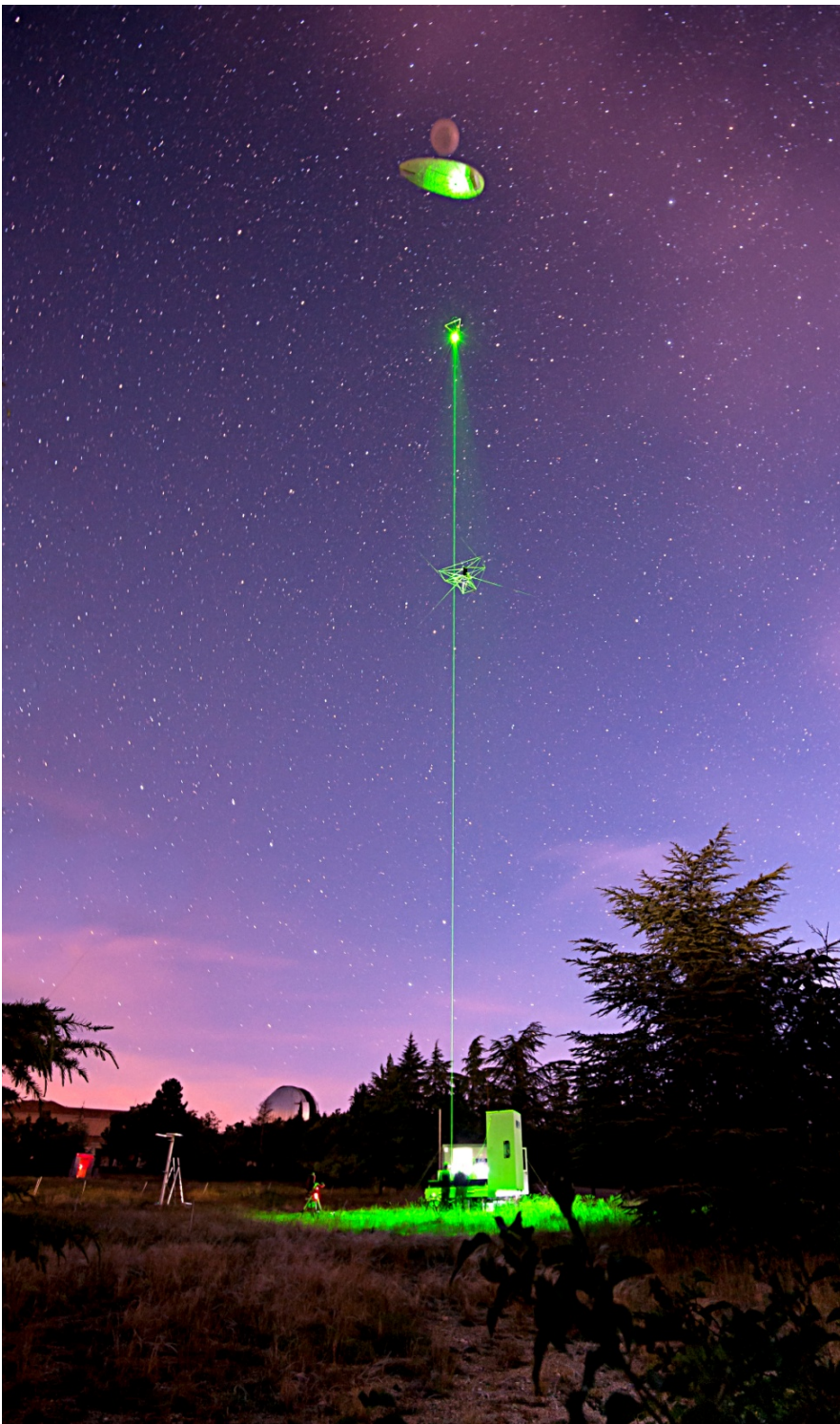
$$\Delta \mathbf{L} = \mathbf{M} \cdot \mathbf{P}_{xy}$$
$$\Delta L = M \cdot P_{xy}$$


Metrology fringes



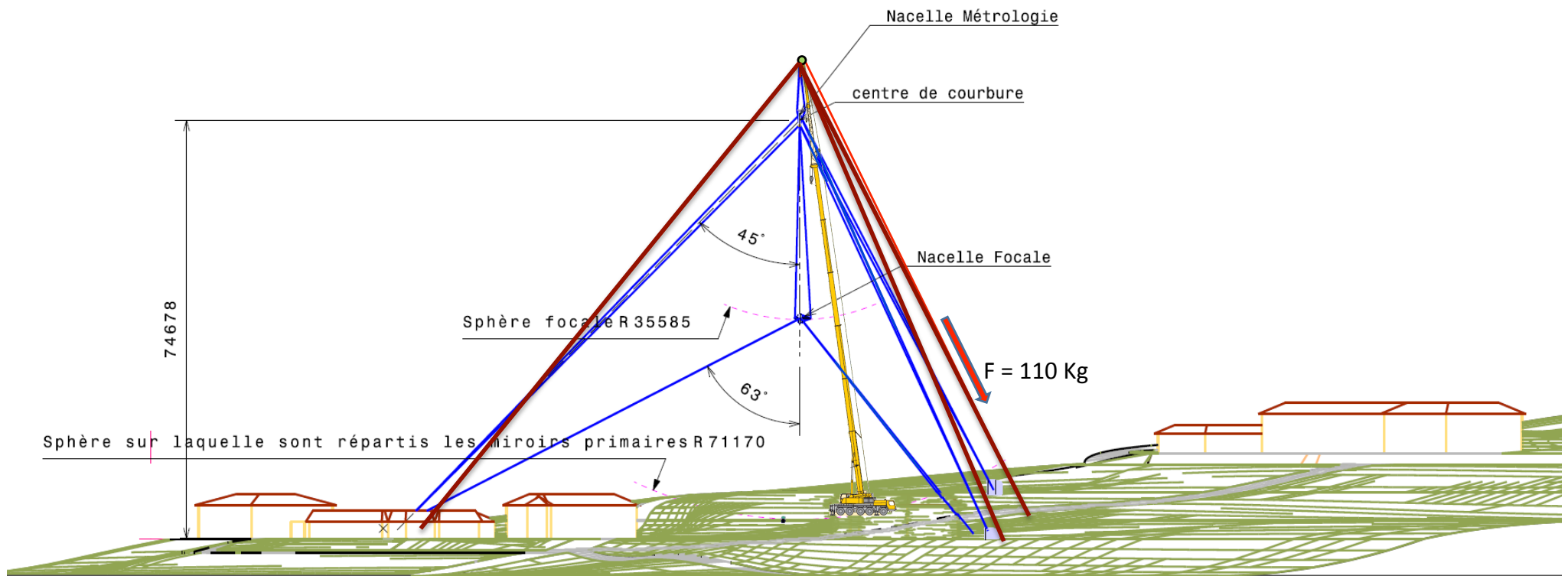
Observations





**Difficult to observe again
with
1-2 balloons !!**

A Crane: a heavy but stable solution to replace the balloon !

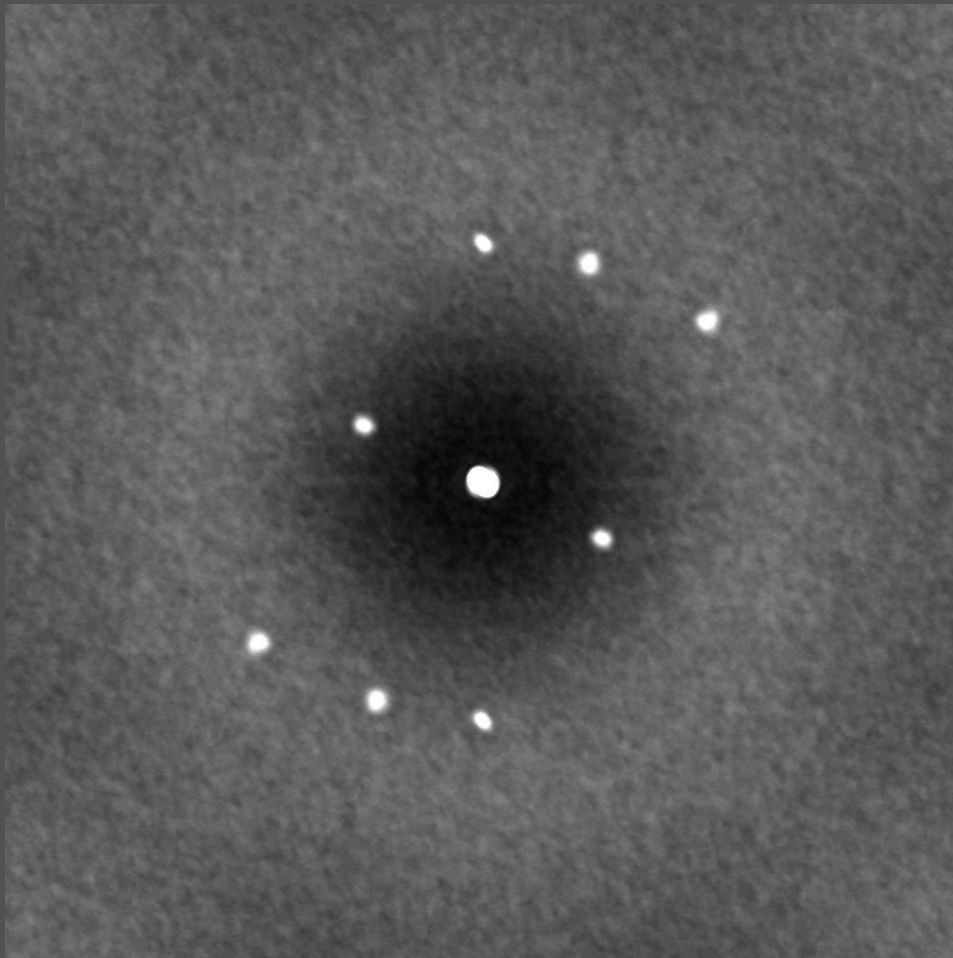


Carlina with a Crane



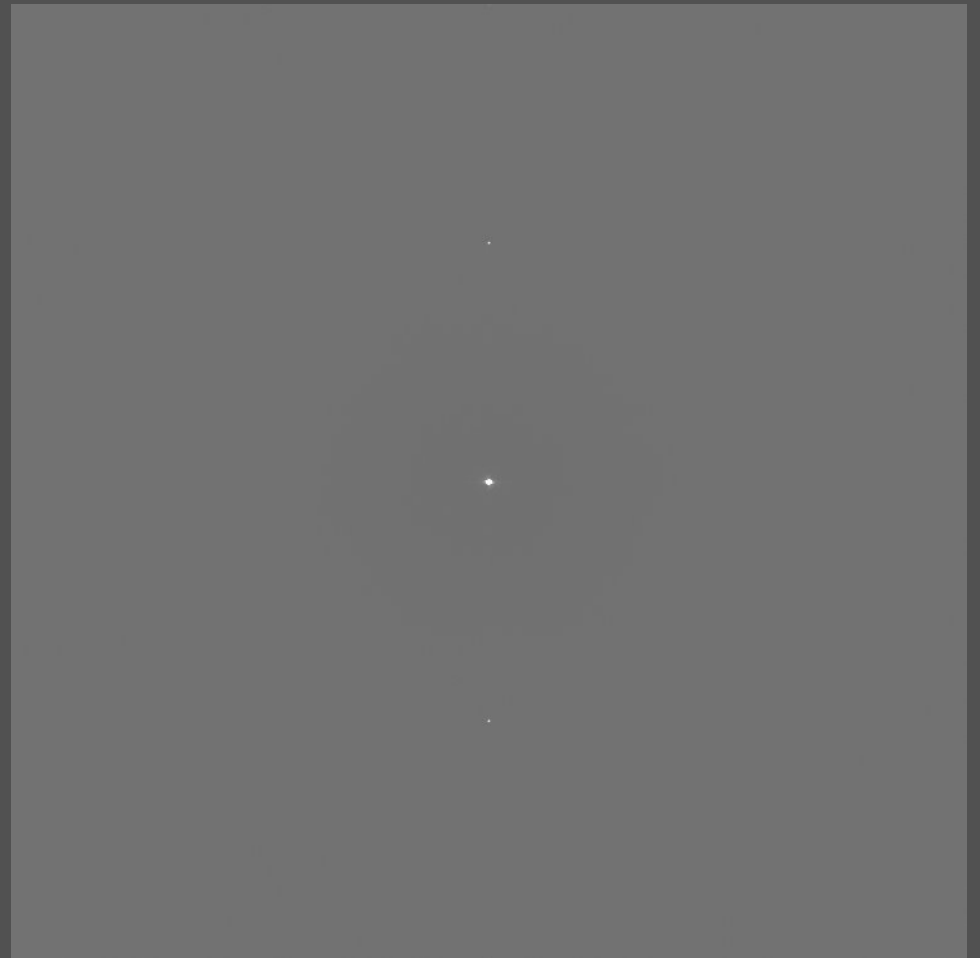
Observation

Power spectrum of a Fizeau recombination in laboratory



Power spectrum of a Fizeau recombination:

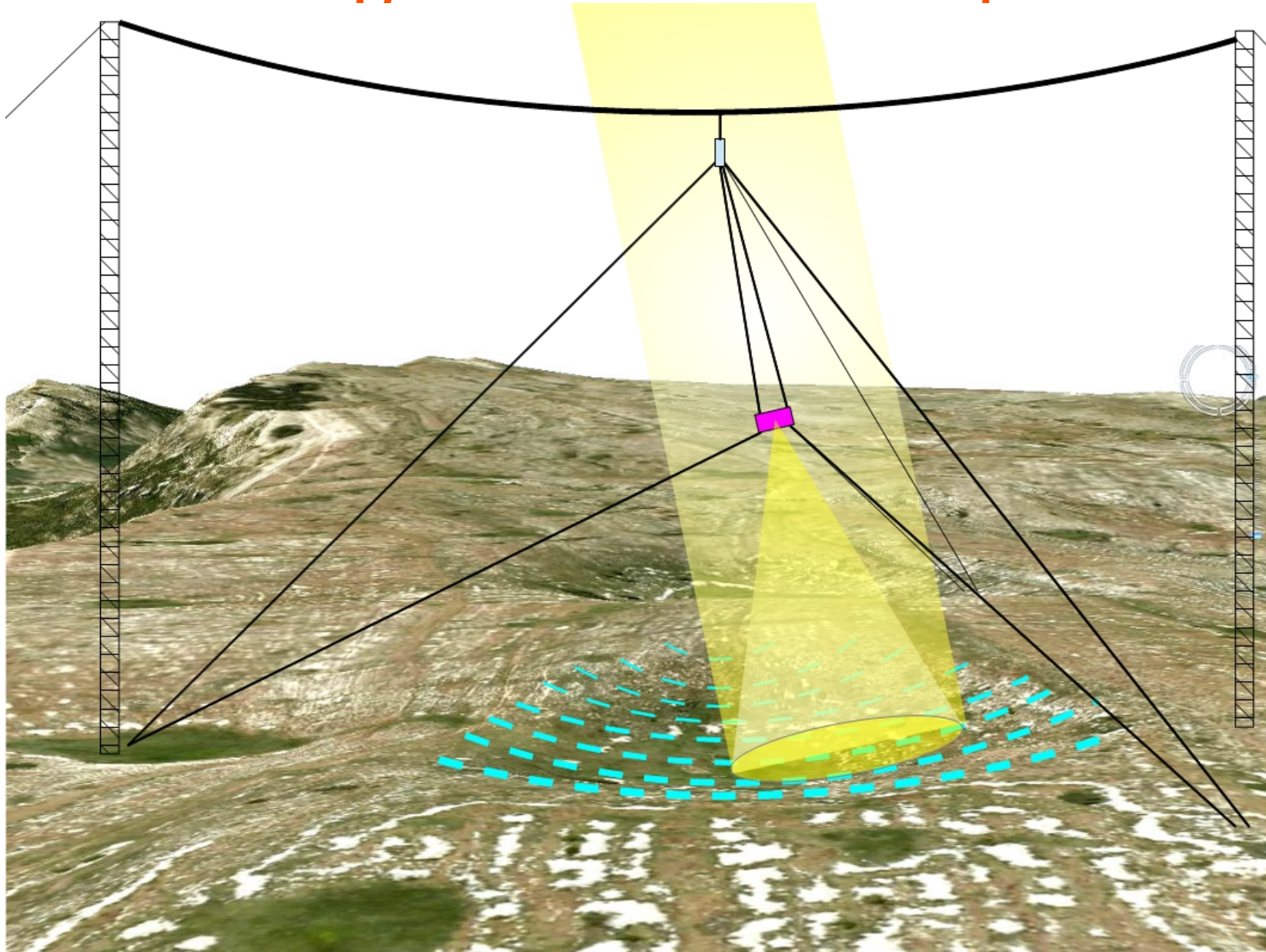
- Stars O AND mv = **3.7**
- 1 baseline (5m)
- tracking 5 min (10 000 exposures of 5 ms)
- mean : 700 ph/exposure with $\Delta\lambda=80\text{nm}$; $\lambda=560\text{ nm}$



Possible reasons that could explain why we didn't detect the fringes !

- Vibration of the cables transmitted to the focal optic.
- The bad atmospheric turbulence at OHP
- Our simple focal Fizeau recombiner not well adapted to the atmospheric turbulence
- Problem with the corrector of spherical aberration !?

Large Diluted Telescope



Conclusion

- ✓ After 10 years of development, the prototype is now completed (metrology, servo loop, focal gondola, etc.)
- ✓ We have found opto-mechanical solutions to stabilize the gondolas attached under cables (the metrology mirror is stabilized with an accuracy of 200 microns !!)
- ✓ We have aligned the primary mirrors with a one microns accuracy.
- ✓ We have measured the quality of the guiding system (1-2" in a low wind)
- ✗ No fringes detected !!

We propose to build a scientific demonstrator with an aperture of $\approx 50-70$ m that we will call the Large Diluted Telescope

