

Grasse laser stations to future

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- 1. Introduction

- 2. Historical Slr fixed station (7835) definitively stopped

- 3. New laboratory build in this place for FTLRS

- 4. Old LLR Station renamed to MEO and completely rebuilt

- 5. Conclusion and prospect

"Grasse laser stations to future" 1. Introduction

Grasse LLR 7845 Station



- 1982 → 1986 Rubis Laser
 - 1166 Normal points

- 1987 → 2005 Yag Laser
 - 8423 Normal points (tot: 13000)

Grasse SLR 7835 Station



- More than
 - 30 years of fruitful operations
 - 35 000 passes

Thanks a lot to all the observers
and engineers for :

Technology and evolutions
maintenance
observing thousand of hours

“Grasse laser stations to future” 2. Historical Slr station stopped

- **Telescope and mount moved in the trailer**







GRGS

DAF

CF

645 BDM 06

PORTS
ALLETTI
DRAP
9123 60
3.91.10.47
461 071



GRG



New life for this telescope/mount

- Telescope waiting departure in South Africa for new SLR/LLR facility

LLR/SLR Development for South Africa in collaboration with GRGS/OCA/CNES France and global scientific community

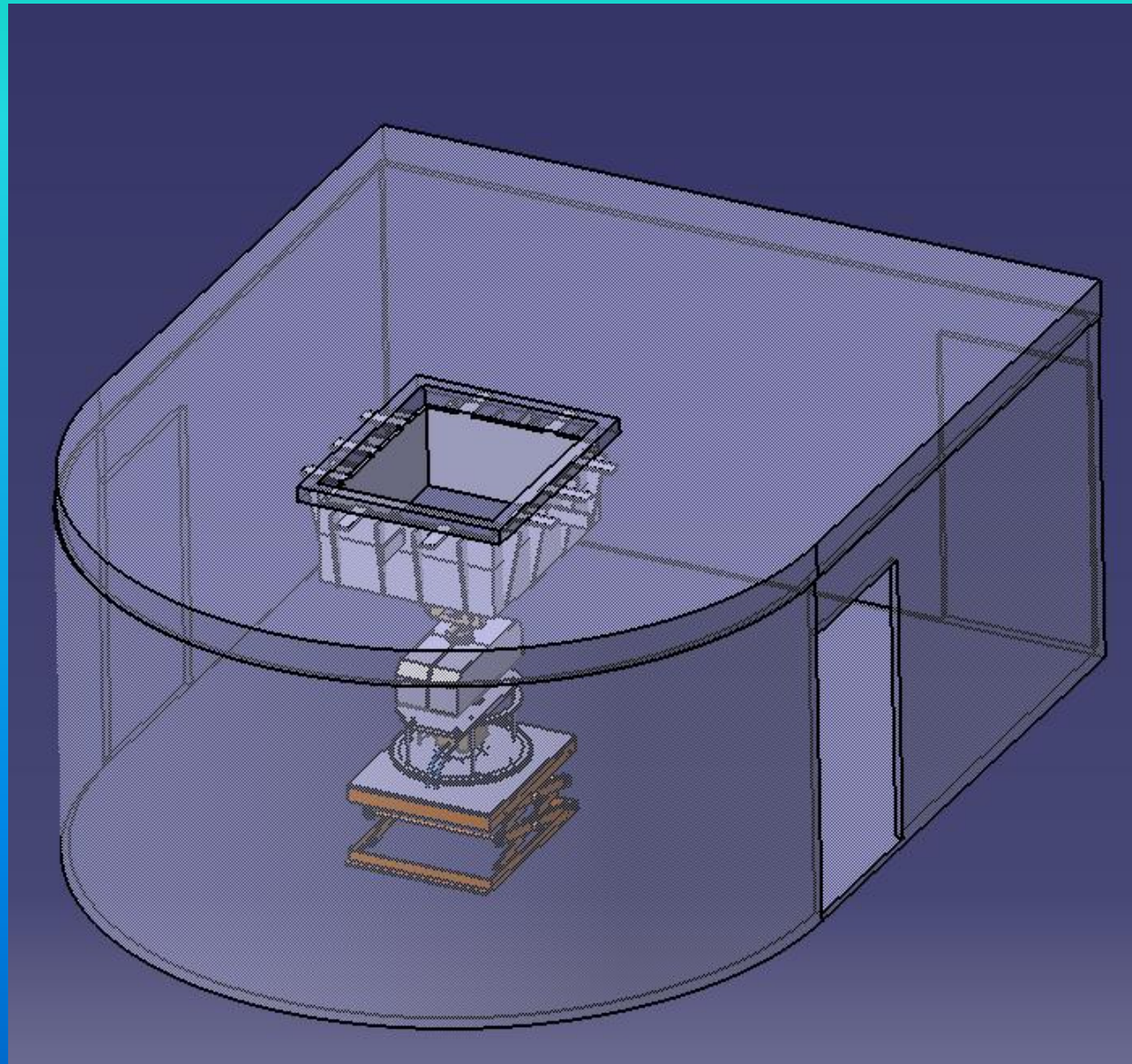
- OCA/CNES 1 m telescope
- Will be refurbished (encoders, drive motors, coude mirrors etc.)
- New laser system to be developed (NdYlf)
- System development at HartRAO before then moved to Matjiesfontein



Site for space geodesy observatory: Matjiesfontein:

70 km south of GFZ Geodynamics Observatory and South African Astronomical Observatory, new LLR will be first major equipment





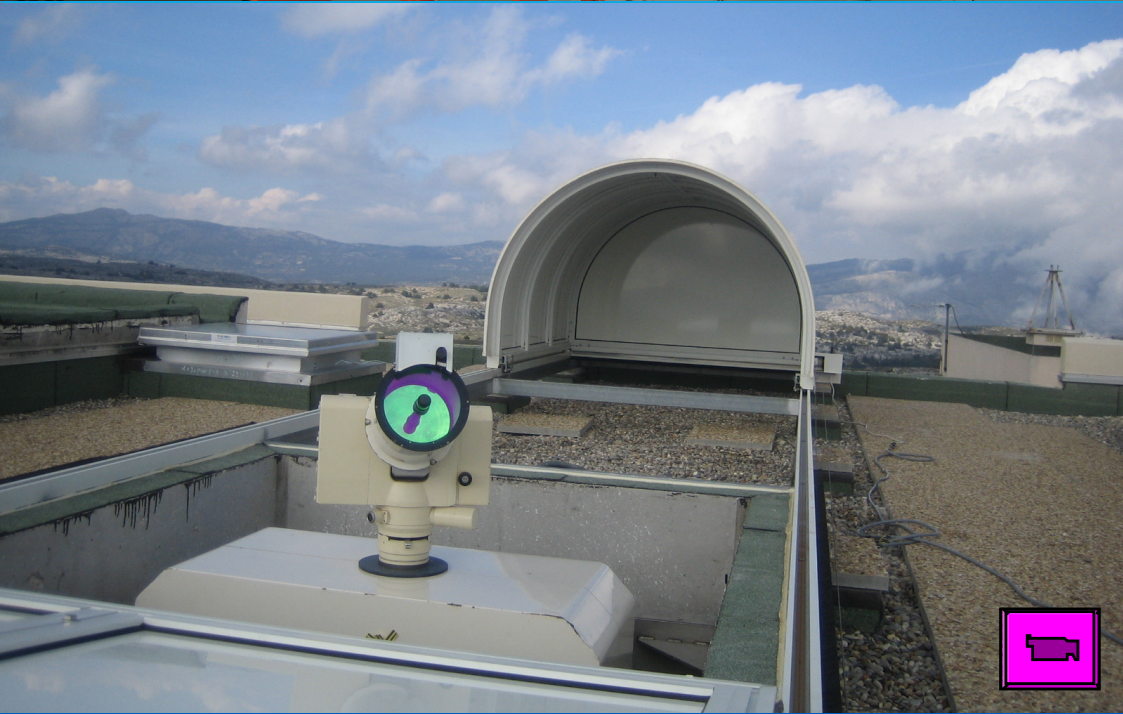
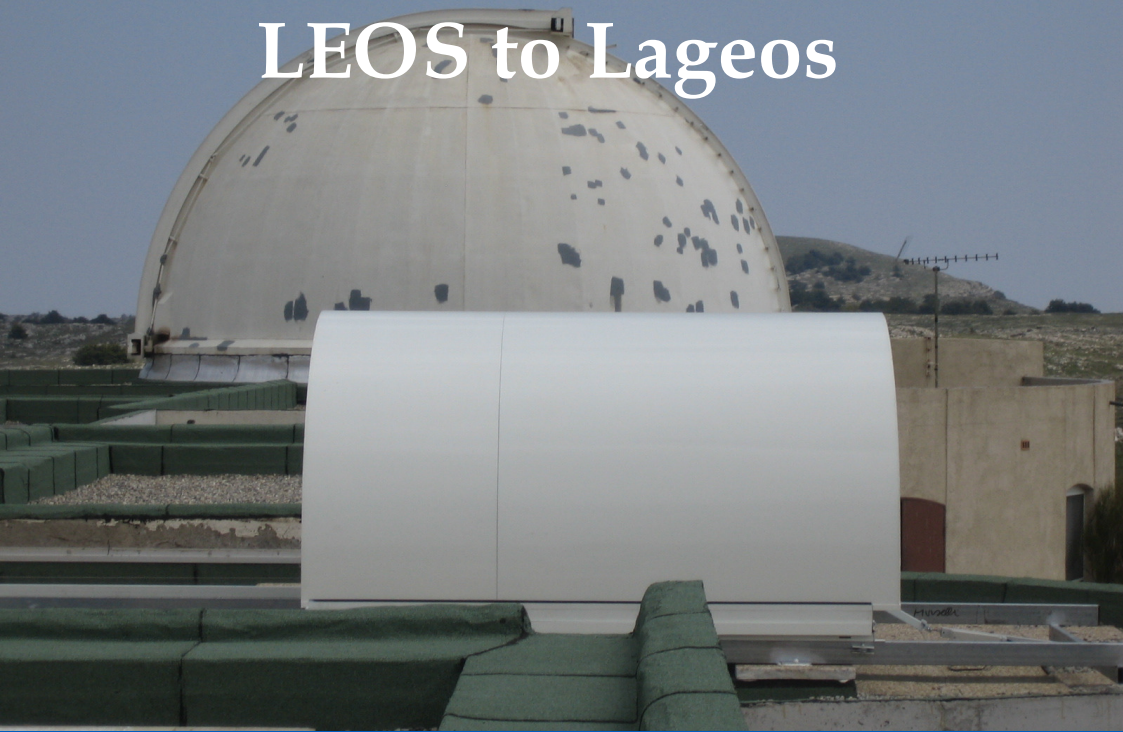


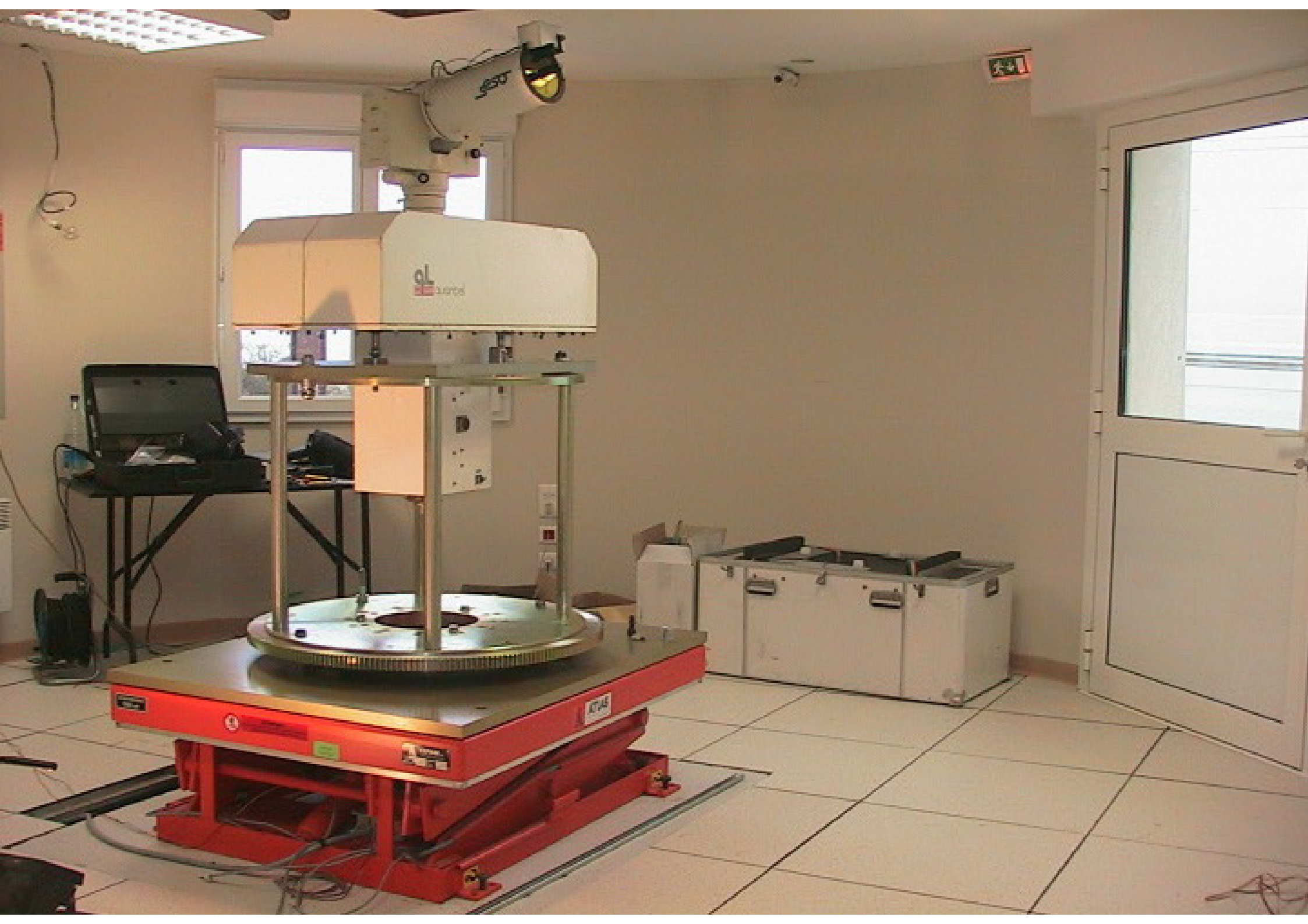
Two positions capability with elevator system and opening roof

- **Down in the lab for Technology developments**
- **Up for Operation on satellites - LEOs to Lageos**

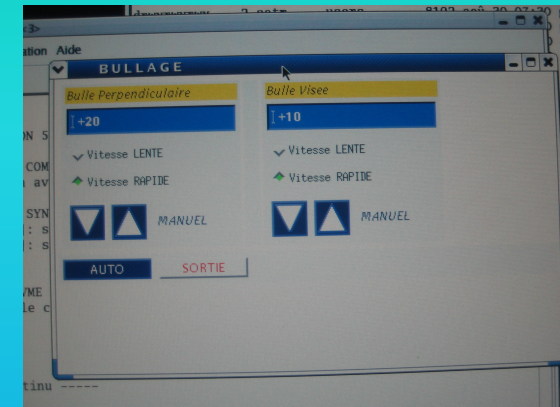


➤ Up for Operation
on satellites -
LEOS to Lageos





Ftlrs during campaigns "in the fields"



- Automatic remote controlled leveling
 - Electric jacks
 - Software control
- Tripod redesigned to be compatible with both configurations
- Laser updated for twice pulses and energy



4. LLR Station renamed to MEO and completely rebuilt

A new generation of Laser Ranging station

- From 400 km to the Moon
- One Way Interplanetary mission
- Highly Automatic



- Instrumental Developments

- » Focus Laboratory
- » Motorisation of the telescope
- » Control Software
- » Automatisation

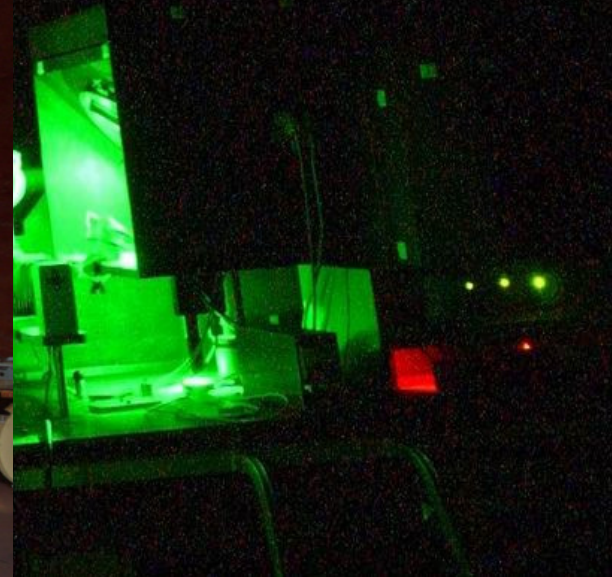
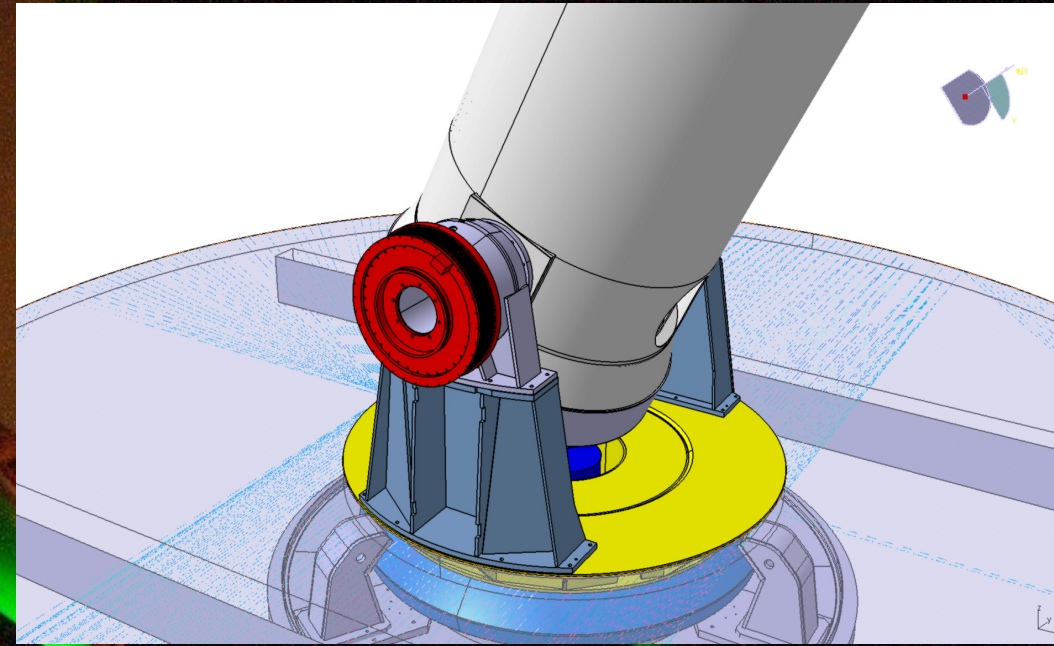
- Research & Development

- » New optical link
- » Detection, Event timer
- » 2 colors
- » atmosphere

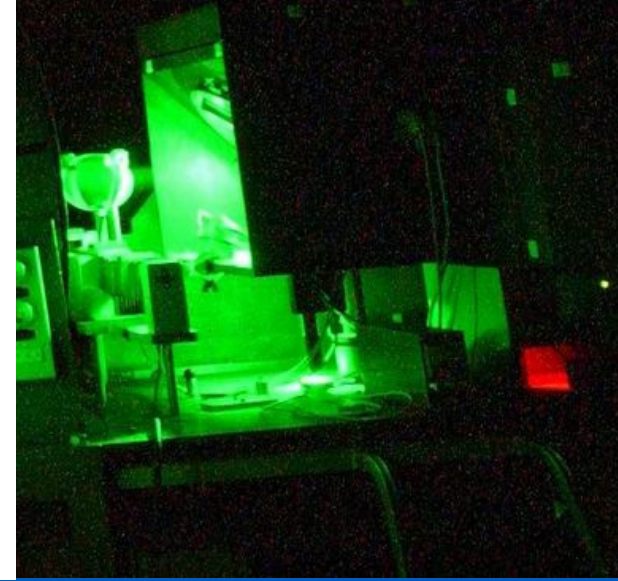
MéO laser ranging station



MéO laser ranging station



MéO laser ranging station



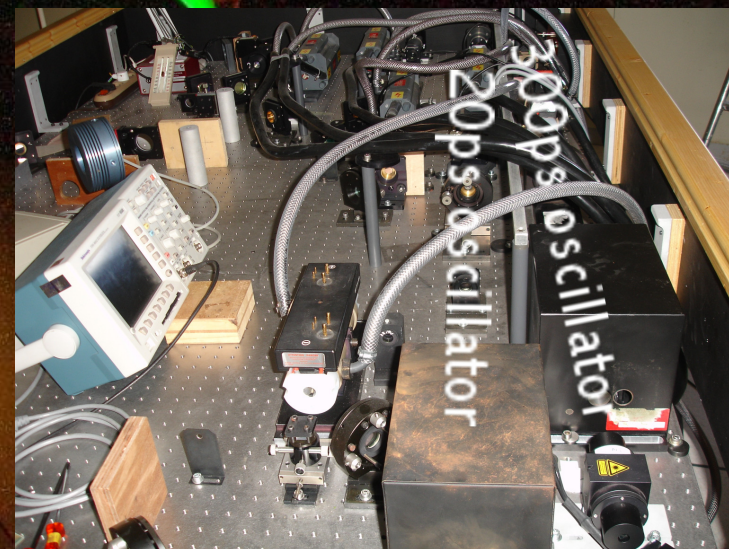
MéO laser ranging station



Laser 300ps QUANTEL



Laser 20ps BMI



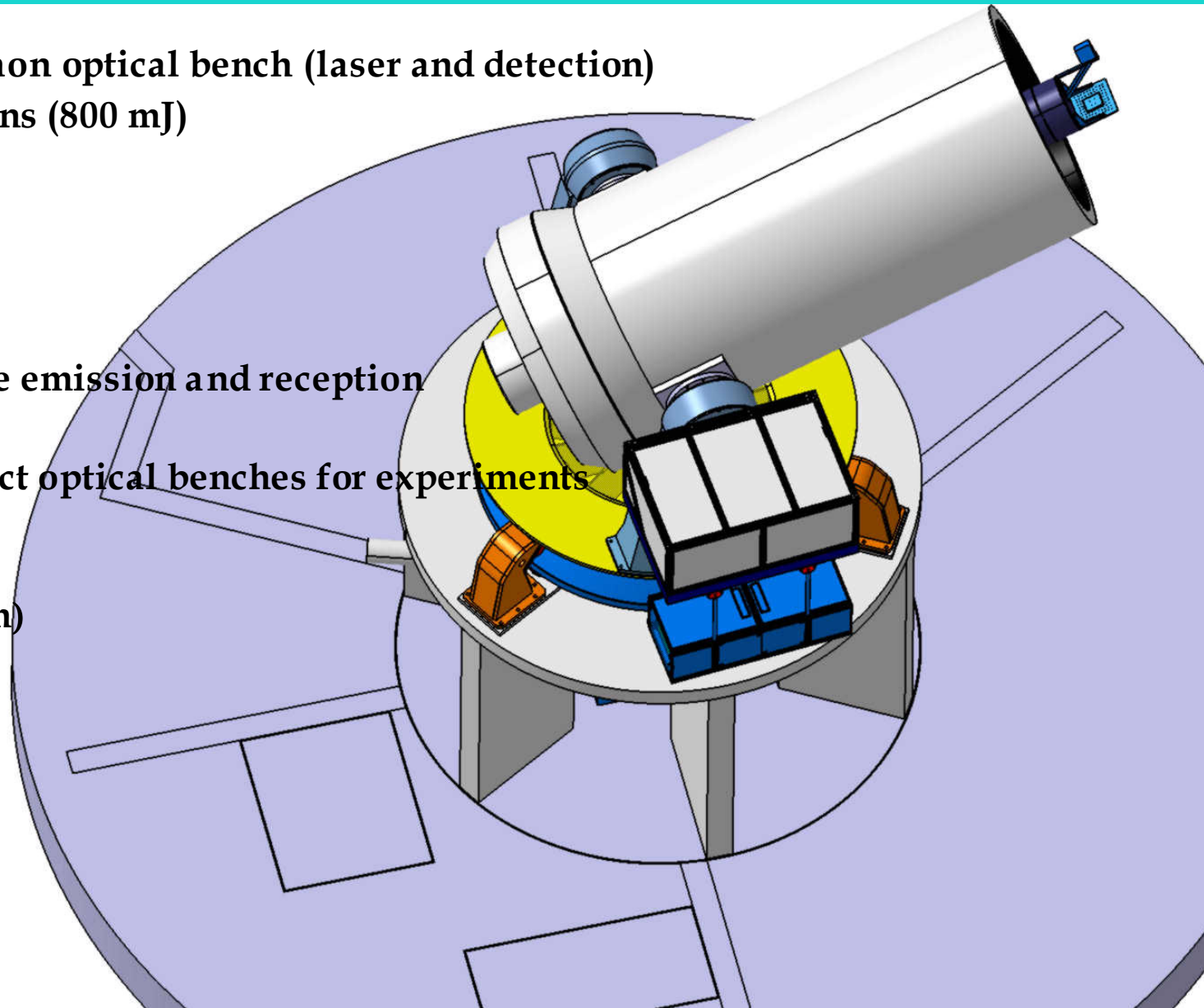
MéO laser ranging station

Schedule for motorisation

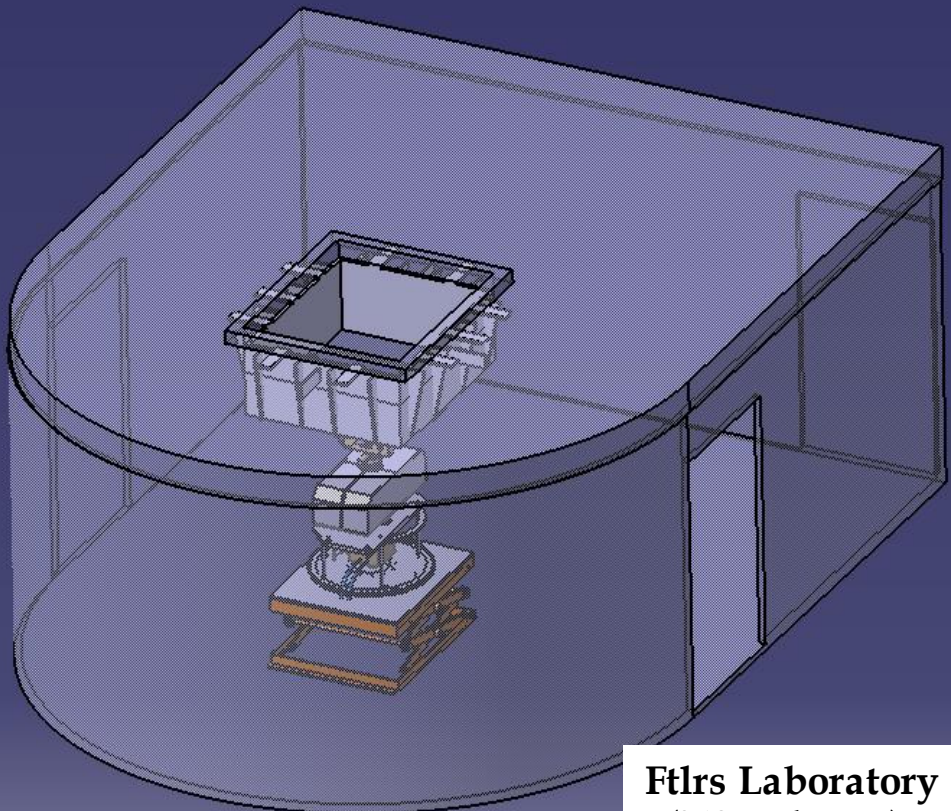
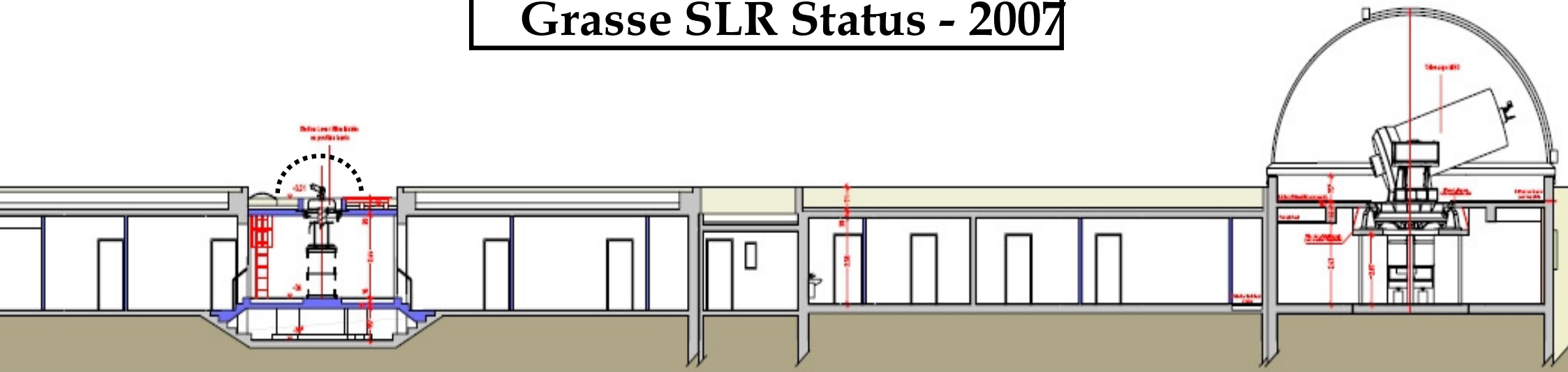
Schedule	Site	Weeks														
		35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Azimuth mechanization, analysis	TD	■	■	■	■	■	■									
Automaton, deseign and wiring	TD	■	■	■												
Automaton integration	OCA				■	■										
Azimuth, CATIA model	TD	■	■	■	■	■	■									
Azimuth engineering (tools and mechanization)	TD					■	■	■	■							
Azimuth assembling tools	OCA			■												
Hydraulic engineering	OCA	■	■	■	■	■										
Azimuth motor, transport to TD	TD										■					
Azimuth mechanization, assembling at TD	TD									■	■	■				
Transport to OCA	TD												■			
Azimuth mechanization, integration at OCA	OCA TD													■	■	■

Meo status - October 2006

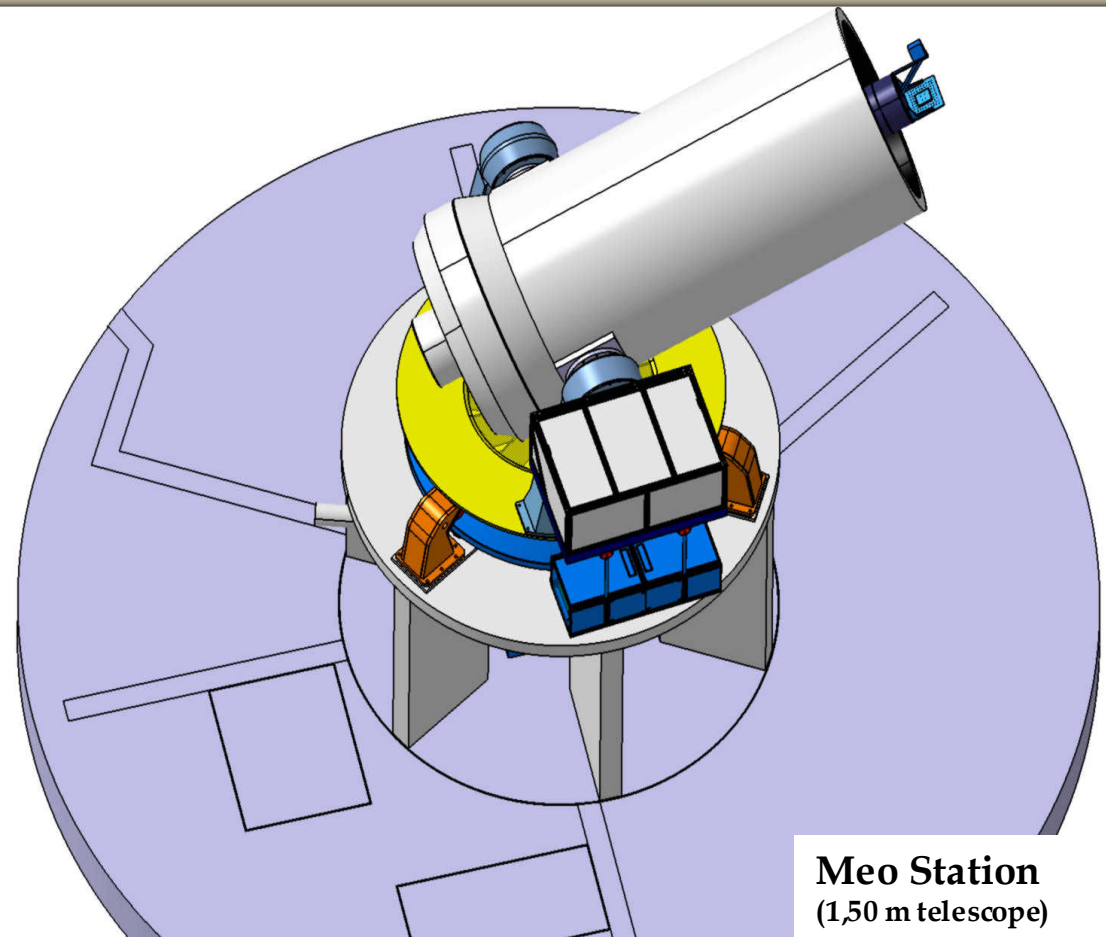
- Laser (2006)
 - » Integrated on the new common optical bench (laser and detection)
 - » 3 cavities : 20 ps - 300 ps - 1 ns (800 mJ)
- Building (june 2006)
- Optics (2007)
 - » Common optical path for the emission and reception
 - » Laser commutation
 - » Flux distribution on 5 distinct optical benches for experiments
- Motorisation (mid 2007)
 - » 2 torque motors ($\Phi = 800$ mm)
 - » Direct coder
- Dome (june 2007)
 - » Electric motorisation
 - » New guiding device



Grasse SLR Status - 2007



Ftlrs Laboratory
(0,13 m telescope)



Meo Station
(1,50 m telescope)

“Grasse laser stations to future” 5. Conclusion and prospect

- Slr fixed station (7835) stopped
 - » 30 years of fruitful operations
 - » Telescope and mount moved in the trailer waiting eventual collaboration abroad
- New laboratory build in this place for FTLRS
 - » Two position capability with elevator system and opening roof
 - » Technology developments
 - » Operation on satellites to Lageos.
- Old LLR Station renamed to MEO and completely refurbished
 - » Earth satellite capability 800 to 36000 km
 - » Moon reflectors
 - » R&D studies and new experiments (Time transfer, transponder...)
- New slr facilities in 12/18 months
 - » Two observing systems (0,13 and 1,50 m telescopes) occasionally collocated
 - » Fields campaign for Ftlrs (maximum 6 months/year)

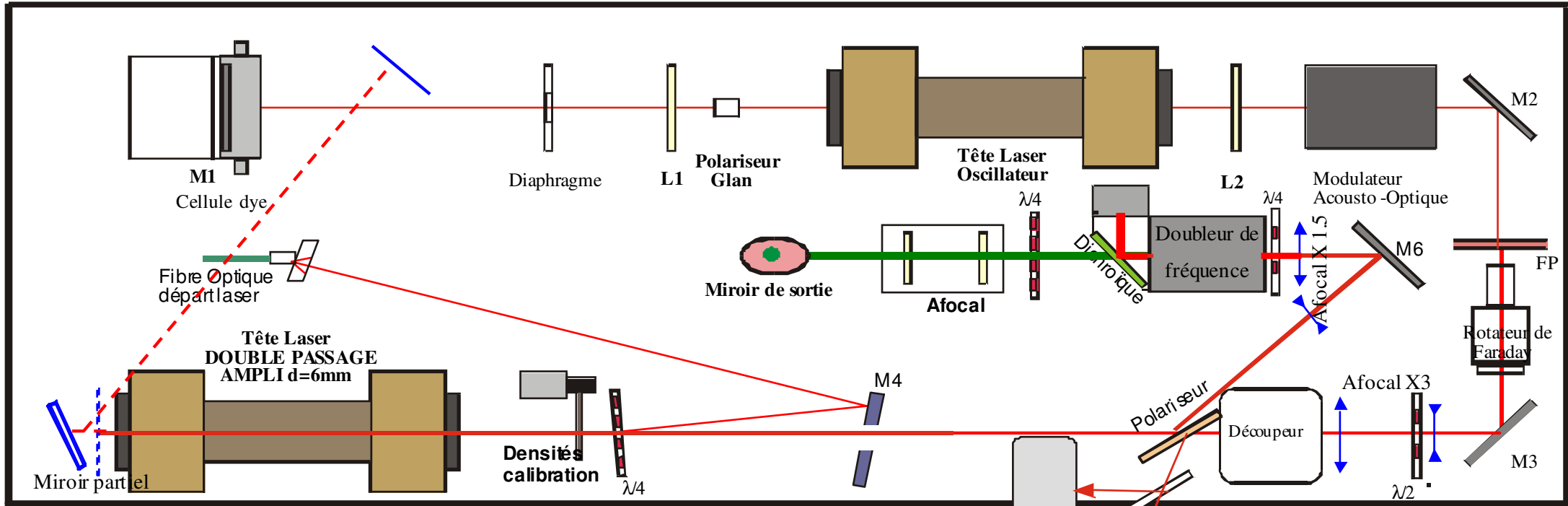
Thanks for your attention...



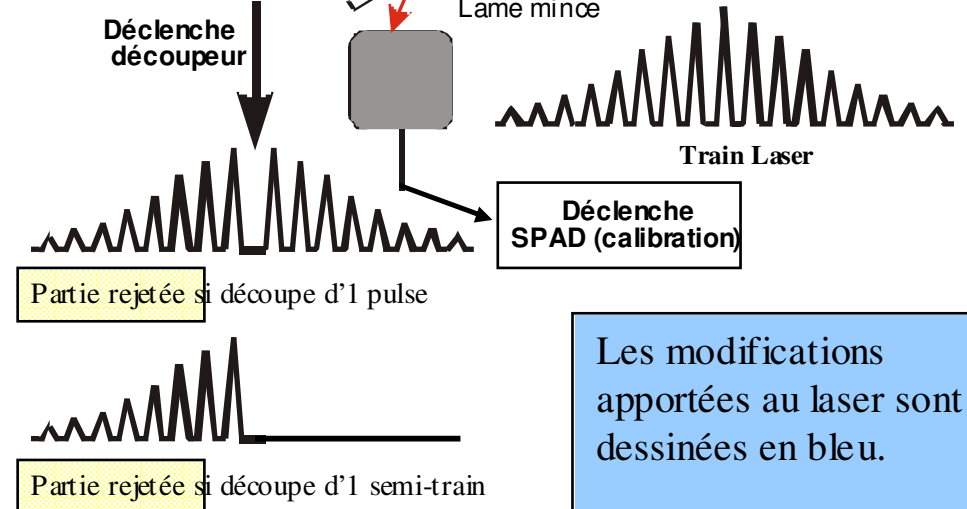
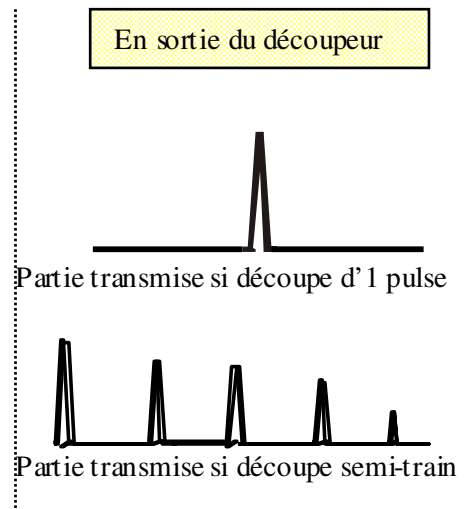
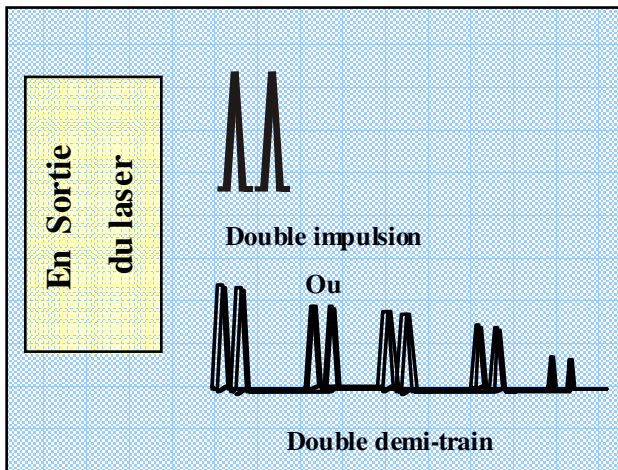
Grasse Observatory - october 2006

LASER station Ultra Mobile : CONCEPTION OPTIQUE

Juillet 2006



T=0.7 ; R=0.3



Les modifications apportées au laser sont dessinées en bleu.

Laser Méo

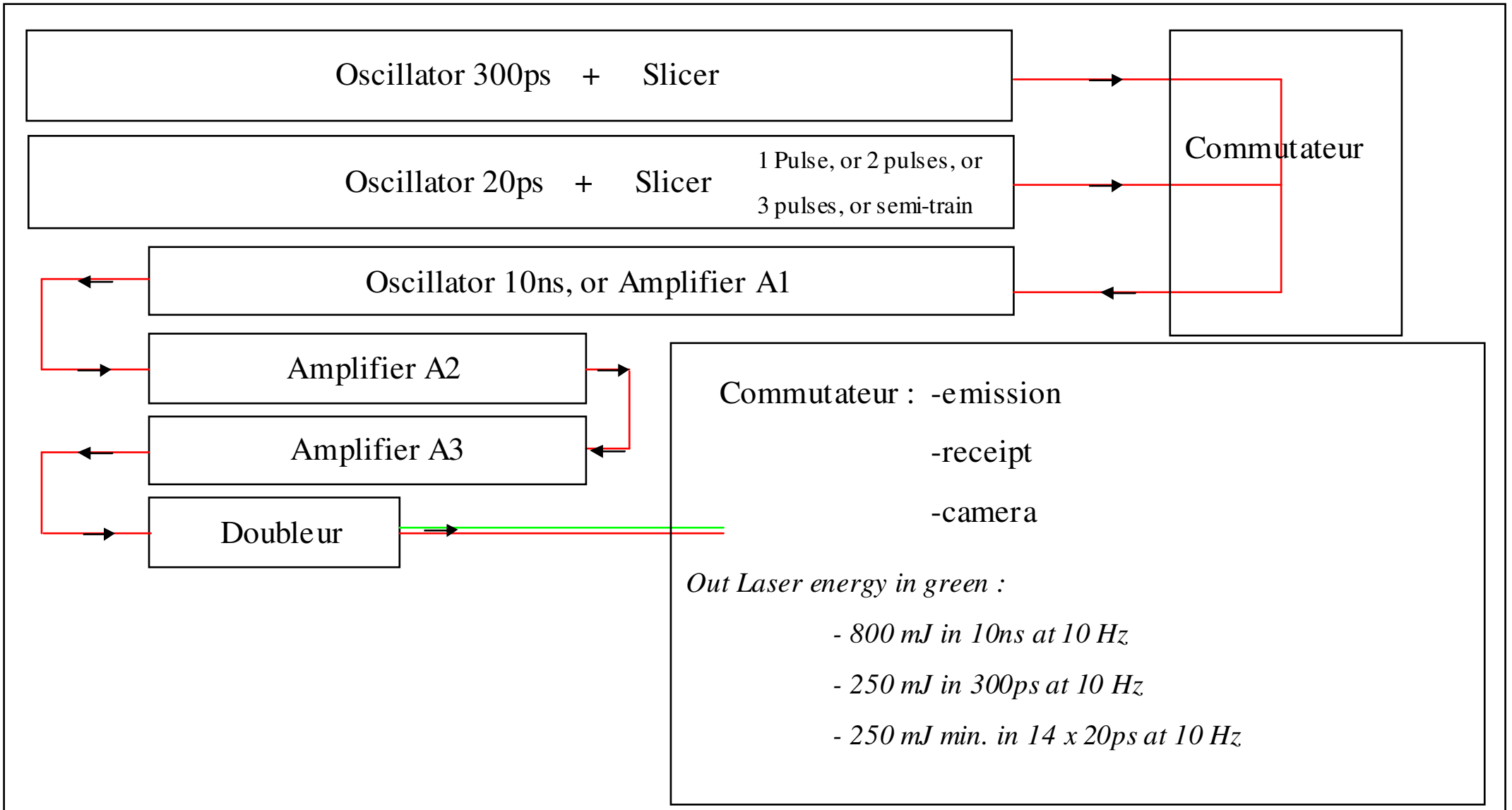
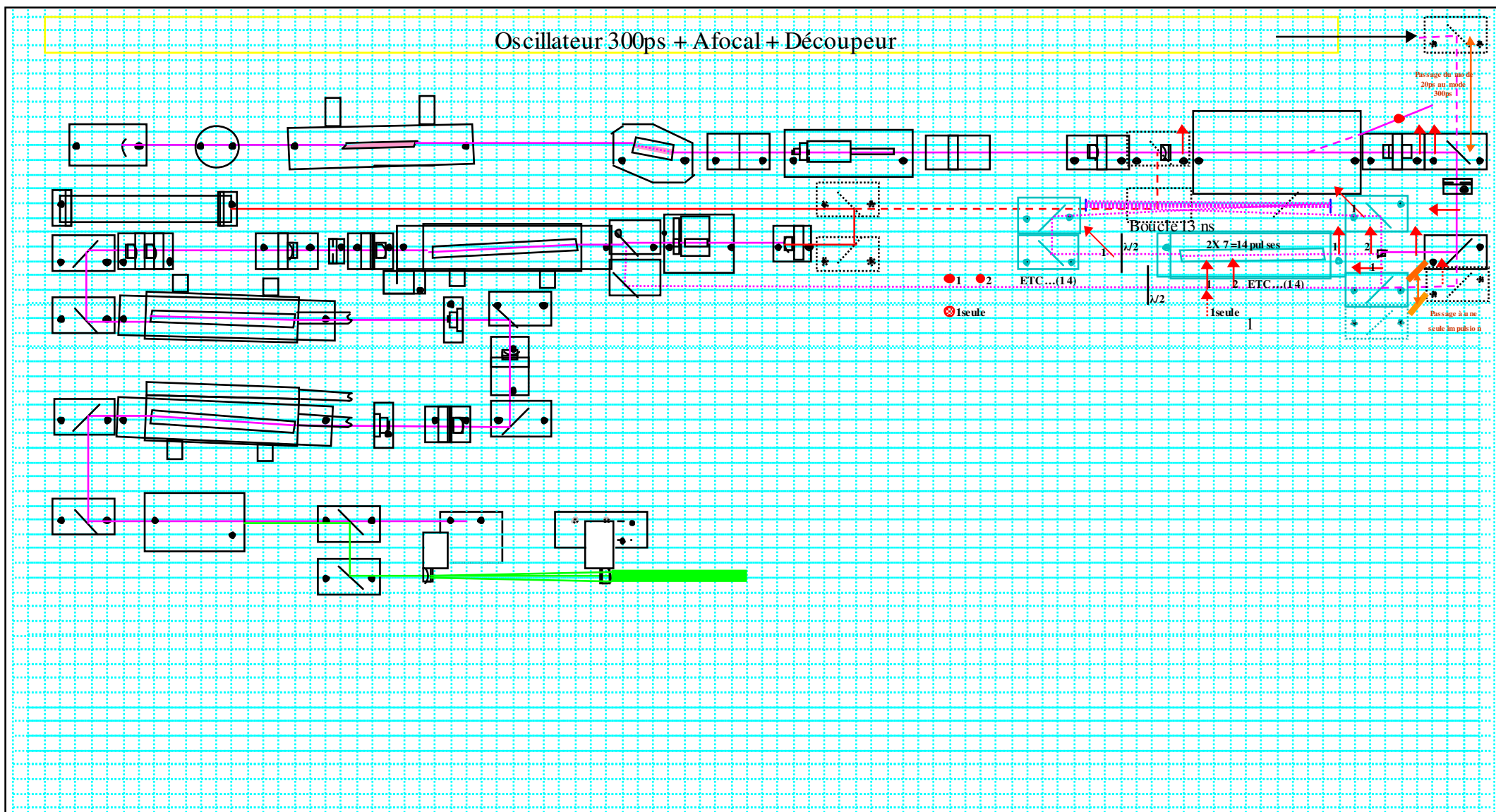


Table de l'expérience télémétrie – Laser Méo



Regenerative Amplifier

with about $G = \sqrt{2}$ -- in : 2 pulses 20ps from slicer

and out : about 14 pulses to other amplifiers

