

INDUSTRIAL DEVELOPMENT IN LOW BACKGROUND NOISE ENVIRONMENTS.

WINLIGHT SYSTEM UPCOMING UNDERGROUND OPERATIONS.

By Eric Compain, Bertin Technologies

eric.compain@bertin.fr

SUMMARY

- ▲ Winlight / Bertin presentations
- ▲ Space and Big Science Activities
- ▲ Focus on Synchrotron activity.
- ▲ Next Synchrotron Generation
 - → Challenge for mirrors manufacturing and control.
- ▲ Underground laboratory @ LSBB.

BERTIN TECHNOLOGIES :

SYSTEMS & INSTRUMENTATION

DETECT, OBSERVE, MEASURE

530
employees

92M€
2021 turnover



LIFE SCIENCES

NUCLEAR &
HEALTH
PHYSICS

CBRN
DETECTION

Overview

Scientific instrumentation for life sciences & radiation detection

Examples

Radioprotection



Envir. Radiation
Monit. systems



Precellys
homogeniser



CBRN threat
detection



2021
Turnover 44M
200 staff

bertin
PHOTONICS

Winlight System

EXENSOR

Director : P. Godefroy



DEFENCE

BIG SCIENCE

SPACE

High-performance optical components & systems

Leader in unattended ground systems solutions

Optronic
surveillance



Optical Ground
System Equipment



Spectrographs for
large telescopes



Wireless
surveillance platform



MEDICAL
WASTE

Leader in medical
waste management
systems

Sterilwave 250



>50%
Of sales from export

>50%
Of revenues
coming from
recurring
industrial products
& services

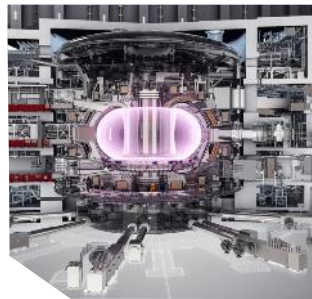
BERTIN PHOTONICS ACTIVITIES OVERVIEW



SPACE



ASTRONOMY



FUSION



SYNCHROTRON



DEFENSE

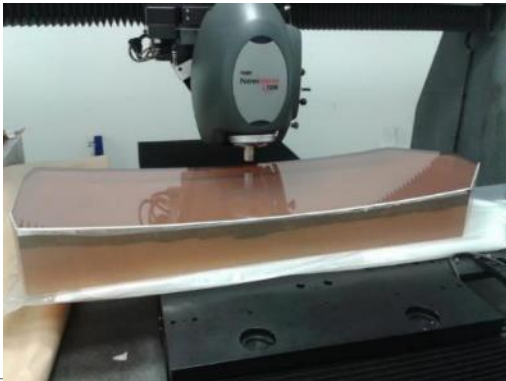
LARGE RESEARCH INSTRUMENTS

A long-exposure photograph of a night sky showing star trails in shades of blue and white. The trails are curved, indicating the Earth's rotation. In the lower-left foreground, a large, white, dome-shaped telescope structure is visible, partially illuminated from below. The sky is a deep blue, and the overall scene is dark, with the star trails providing the primary light source. The word "ASTRONOMY" is centered in the upper half of the image in a white, sans-serif font.

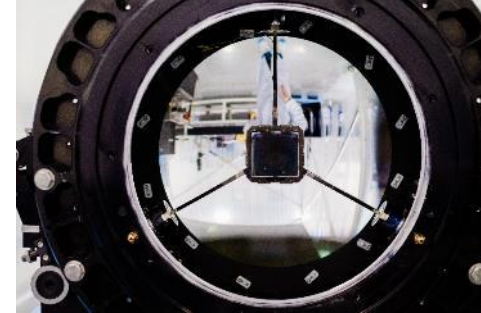
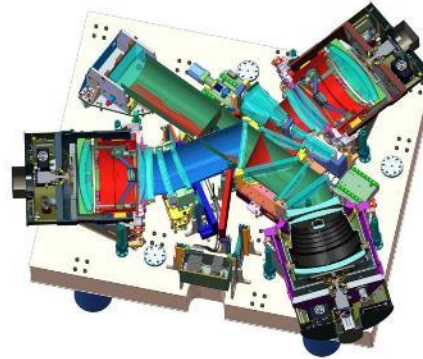
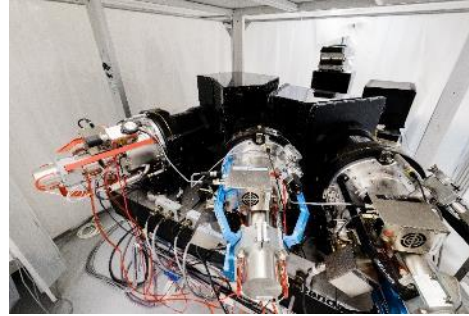
ASTRONOMY

KEY TECHNOLOGIES

High performance optics

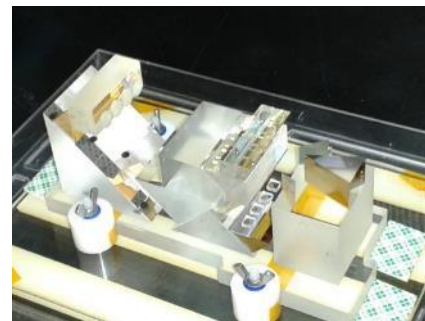
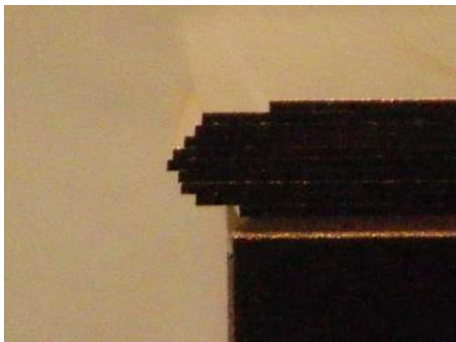


COMPLETE OPTICAL SYSTEMS

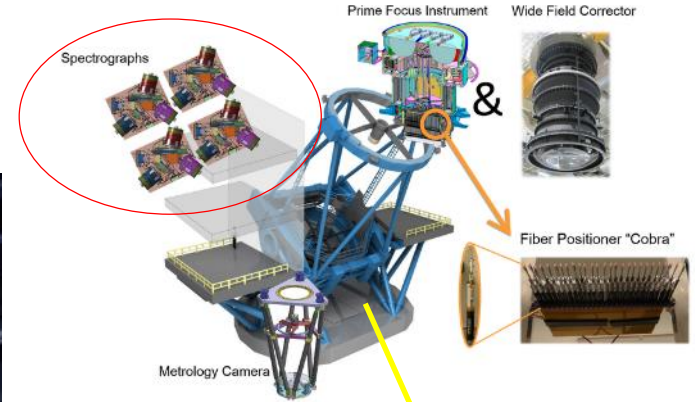
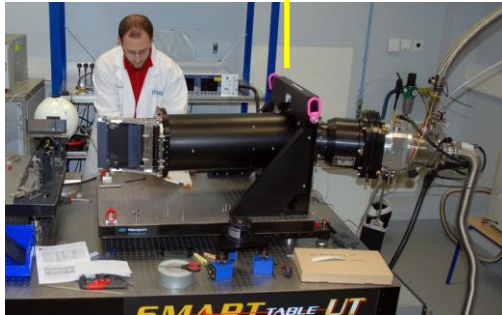
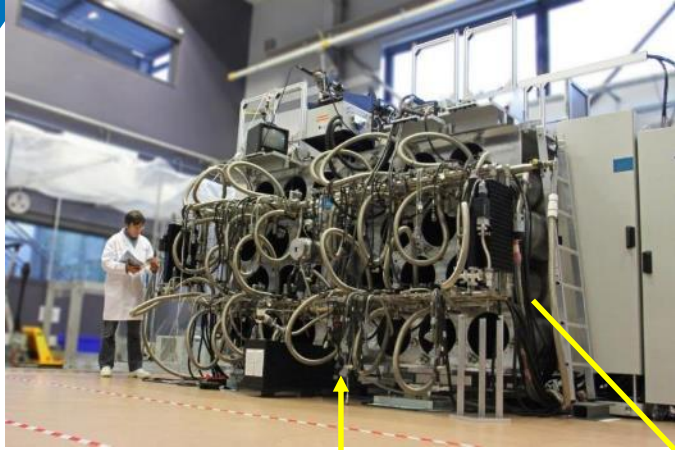


SPECIFIC PROCESS

- ▲ Optical bonding
- ▲ Molecular Adhesion



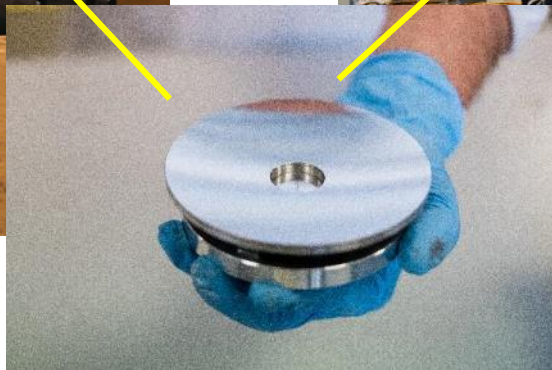
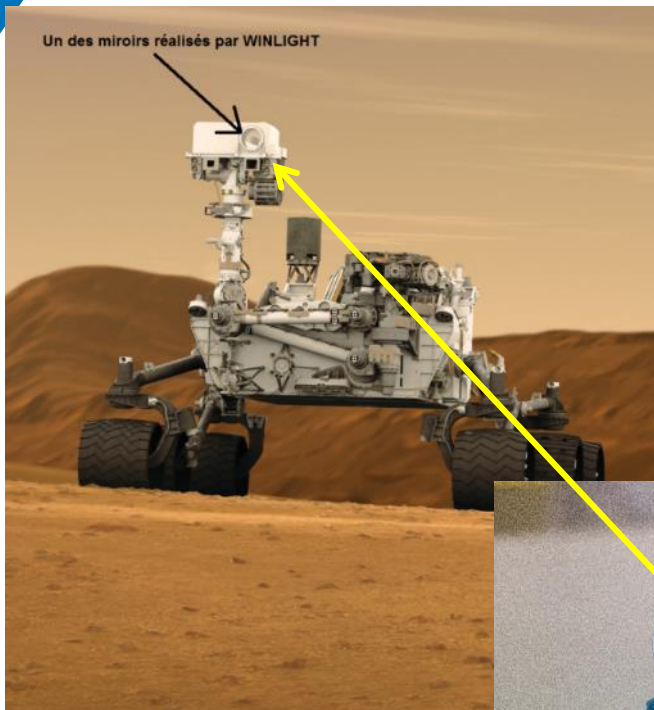
OUR CUSTOMERS : LARGE INTERNATIONAL PROJECTS



SPACE



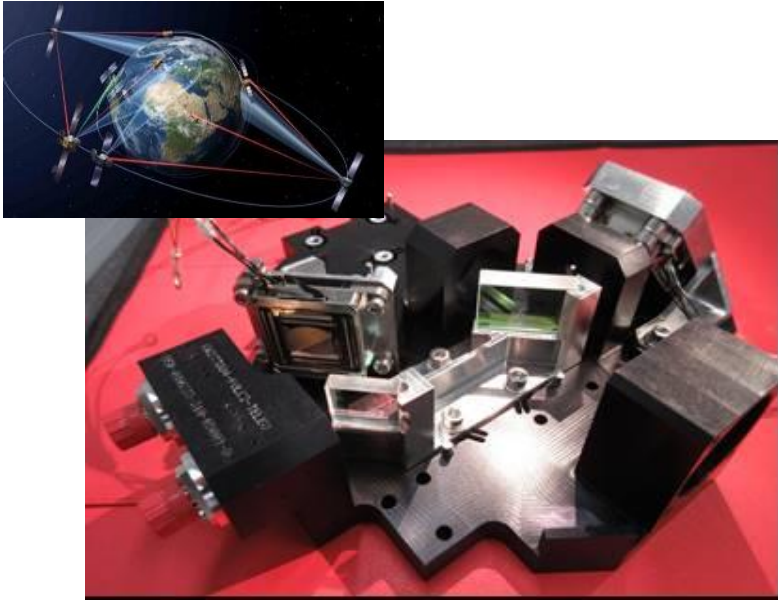
PARTICIPATION TO INTERNATIONAL PROGRAMS (AIRBUS, CNES, NASA, ...)



SuperCam,
Instrument of *Curiosity* rover

PAYLOADS FOR TELECOMMUNICATION AND SCIENCE

Optical telecommunication

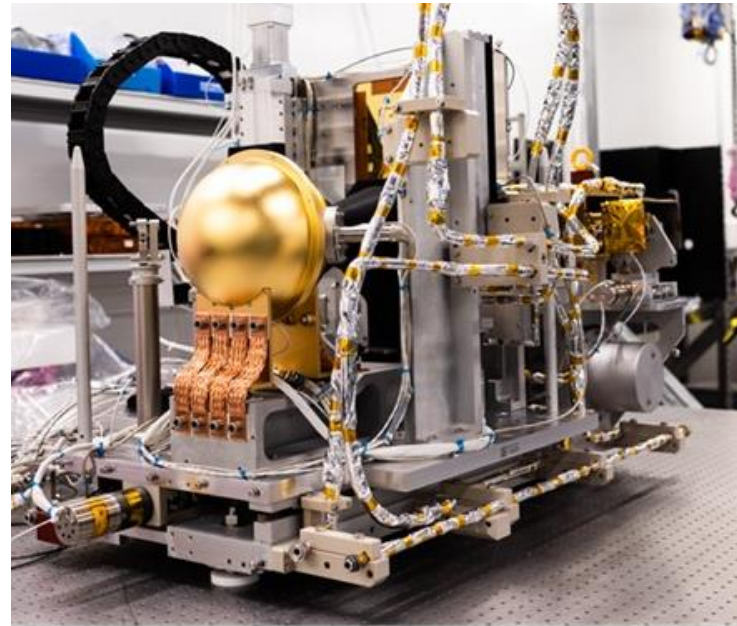


TARANIS: Photometer sub system



OPTICAL GROUND SUPPORT EQUIPMENTS

▲ For Meteosat 3rd Génération



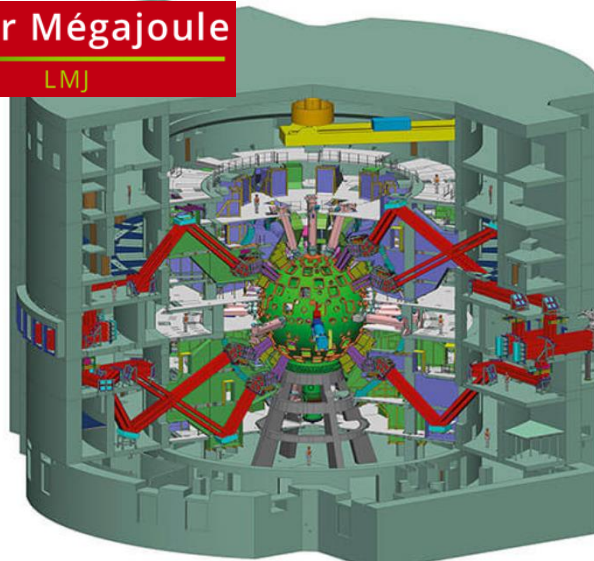
→ Under vacuum qualification of payloads.

BIG SCIENCE – FUSION -

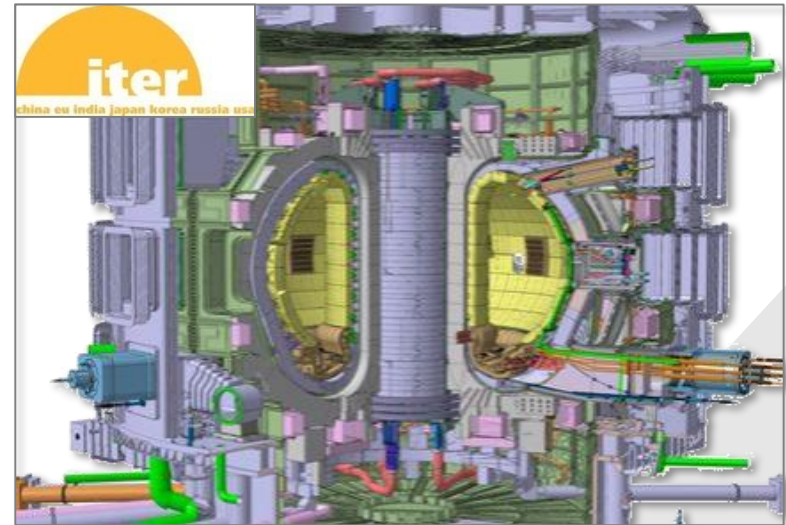
DEVELOPMENT AND MANUFACTURING OF PLASMA DIAGNOSTIC SYSTEMS FOR INERTIAL CONFINEMENT

Laser Mégajoule

LMJ

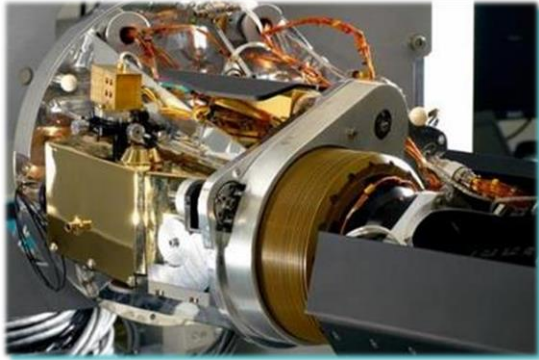


MAGNETIC CONFINEMENT

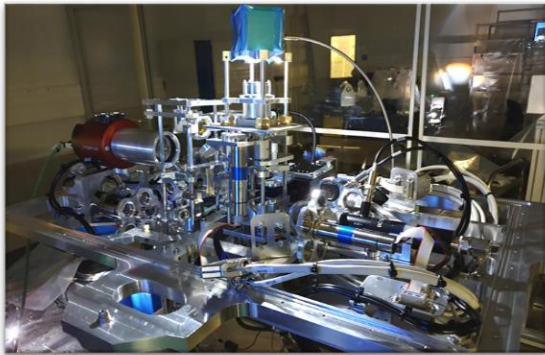


INERTIAL FUSION – VERY FAST MEASUREMENTS (100 PS)

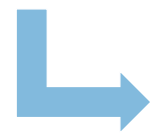
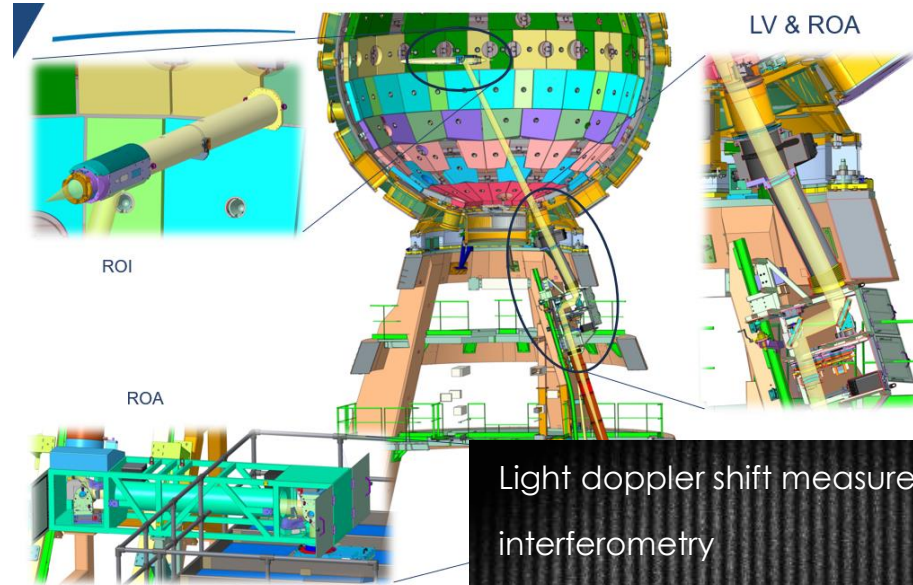
▷ Optomechanics system for alignments



▷ Energy budgets

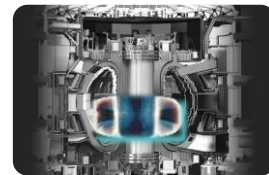


▷ Target velocimetry and temperature measurements

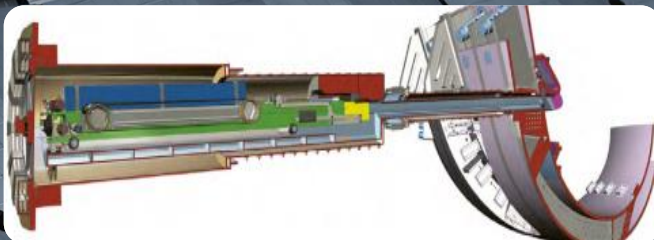


Light doppler shift measured by interferometry

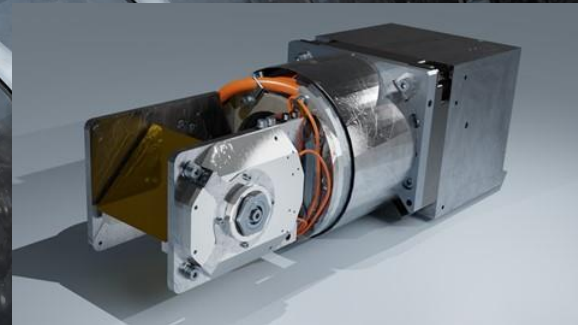
MAGNETIC FUSION (ITER) – IVVS (F4E)



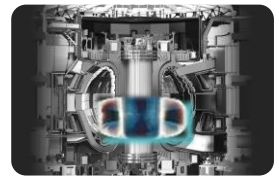
- ▷ Control Plasma confinement surface erosion with a 3D LIDAR.



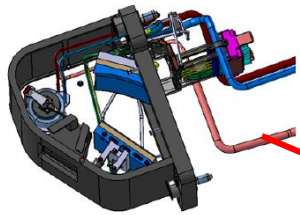
ITER In vessel viewing system for inspection and metrology equipment of ITER vacuum vessel



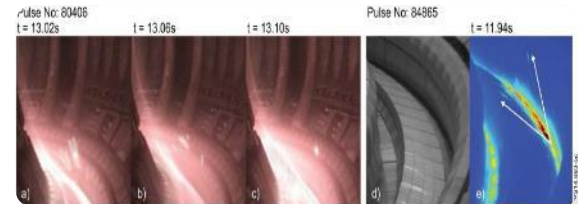
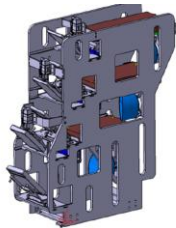
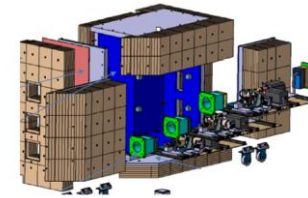
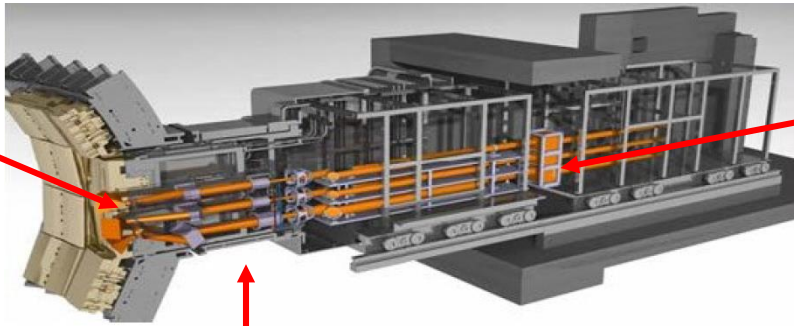
MAGNETIC FUSION (ITER) – WAVS (UPPER & EQU)



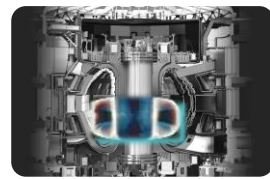
- ▶ Control Plasma confinement surface temperature with IR imaging endoscopes.



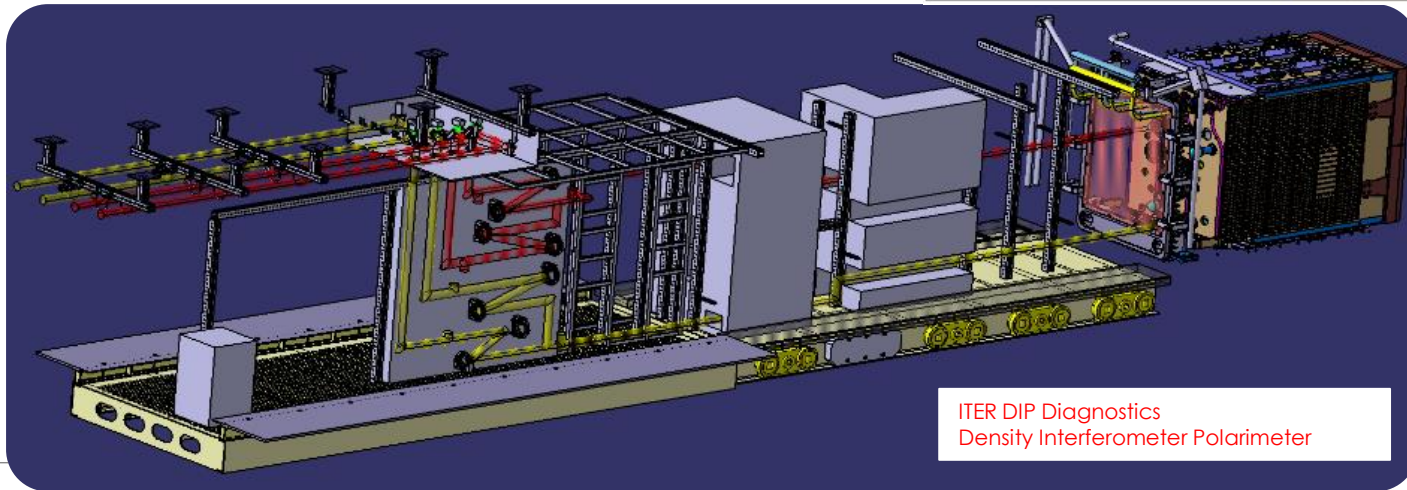
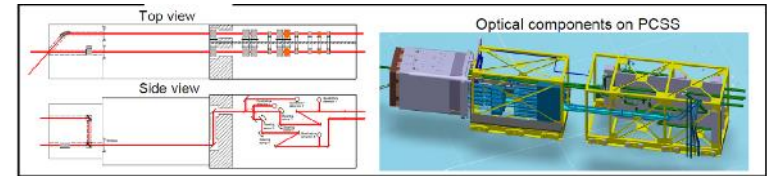
VIS IR Equatorial & Upper Diagnostics



MAGNETIC FUSION (ITER) – DIP



- ▶ Control the fueling of the Plasma :
 - Electron density measurement and control
 - Interferometry and polarimetry technics

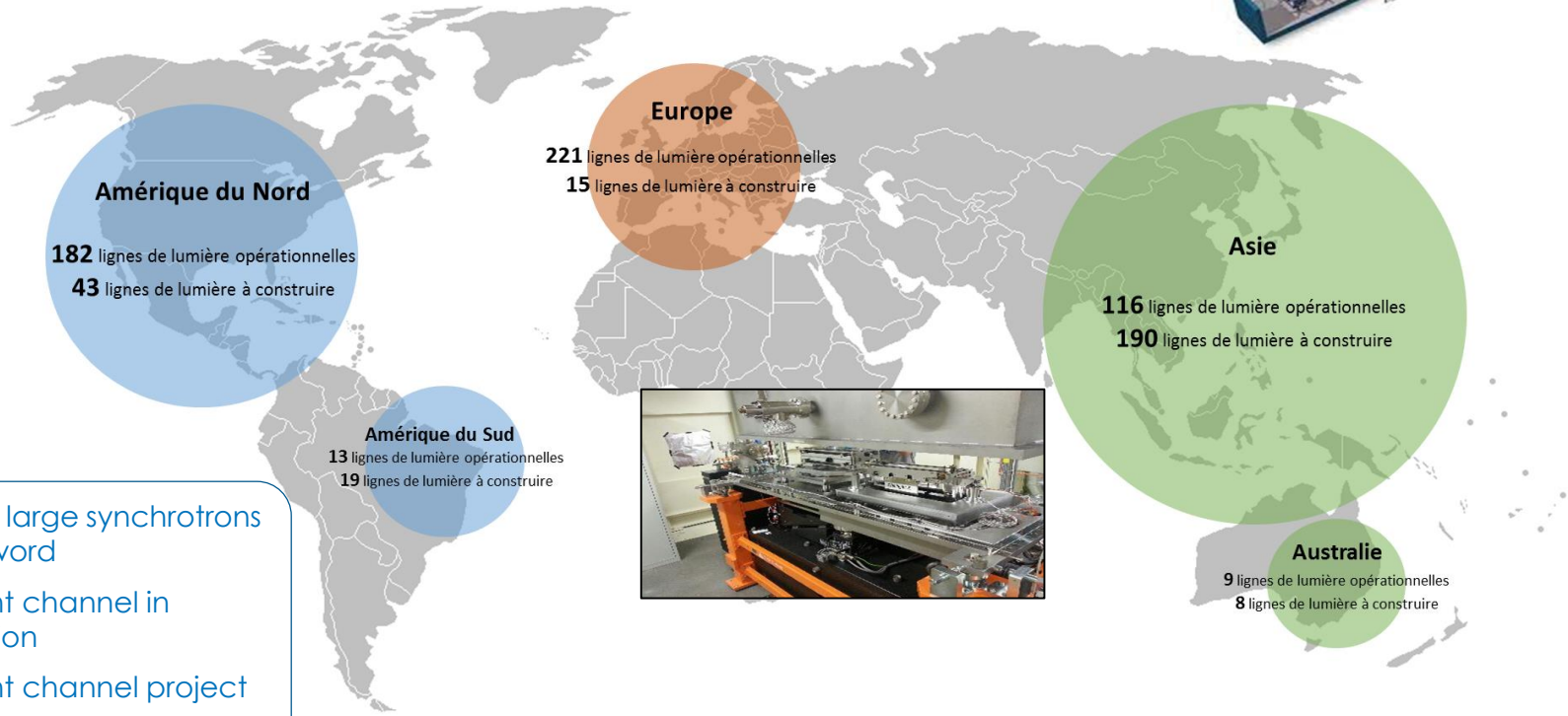
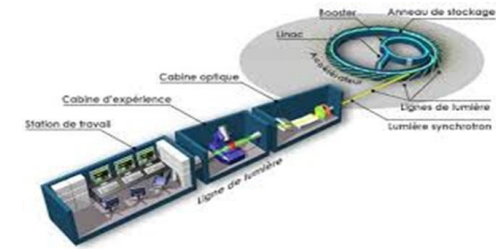


ITER DIP Diagnostics
Density Interferometer Polarimeter

SYNCHROTRON

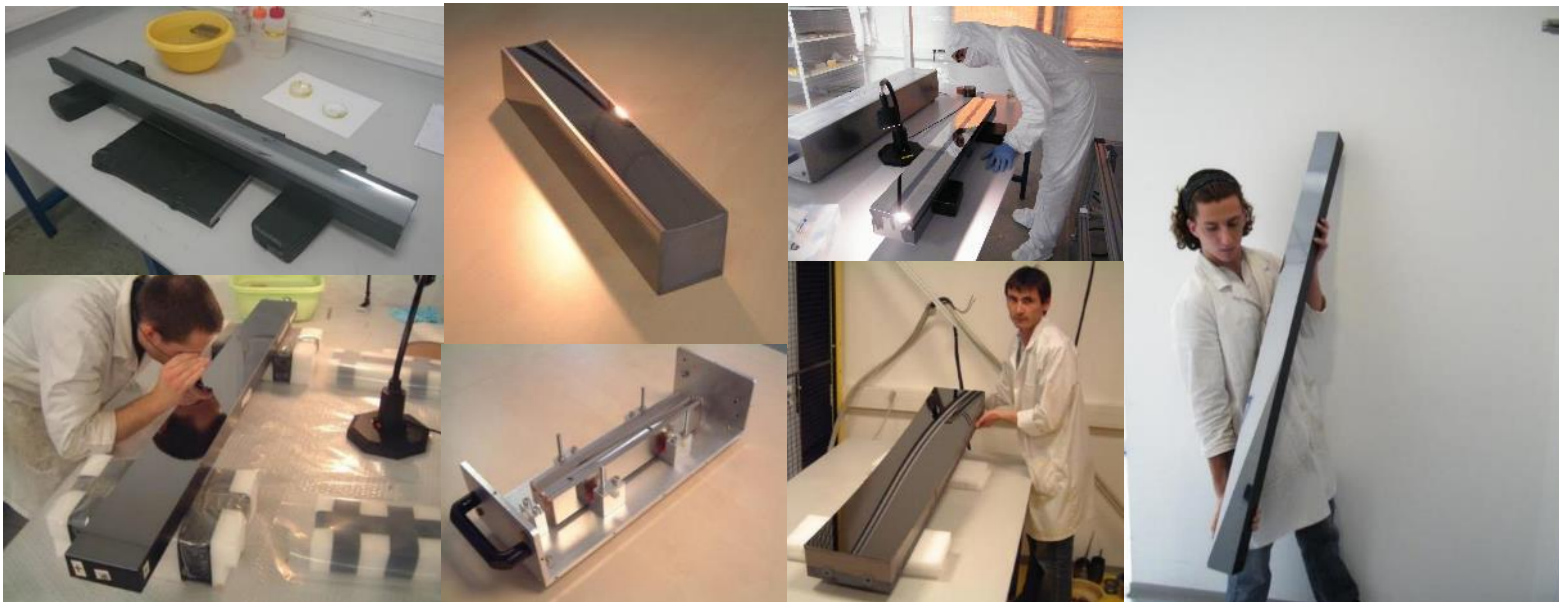


SYNCHROTRON : A STRONG GROWTH WORLD WILD MARKET



- ▲ 30 very large synchrotrons in the world
- ▲ 541 light channel in operation
- ▲ 275 light channel project

WINLIGHT IS ACTING ON X-RAY MARKET SINCE 2002



▲ More than 600 mirrors delivered worldwide

PLANO, CYLINDERS, SPHERICAL, ELLIPTICAL, ELLIPSOIDAL (UNDER DEVELOPMENT)
COATINGS: GOLD, RHODHIUM, IRIIDIUM; PLATINUM, PALADIUM, CHROME, NICKEL

MIRRORS IN UHV HOLDERS, BENDERS, WITH COOLING

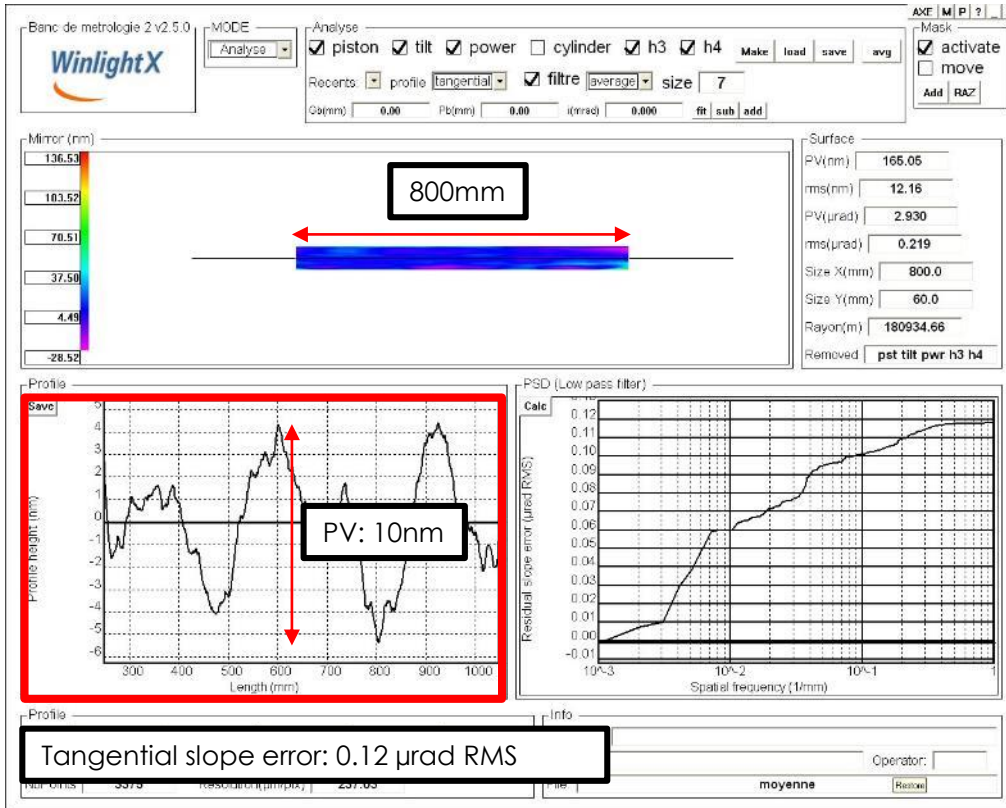


CURRENT STATUS AND IMPROVEMENT CHALLENGE

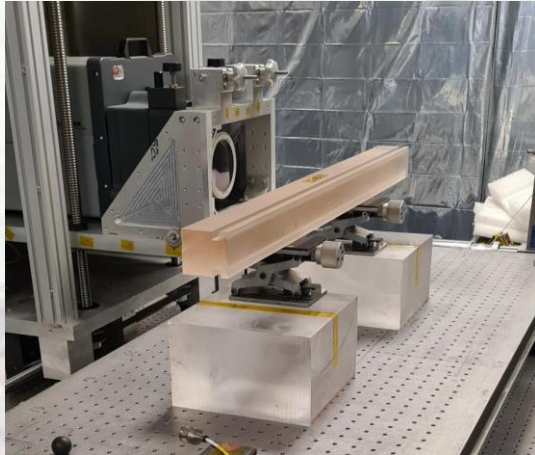
→ Example of mirror done at WINLIGHT

MARKET EXPECTATION :Optical quality improvement by 10 times to reach 1 nm PTV on 1 meter long mirror + 1A rms roughness

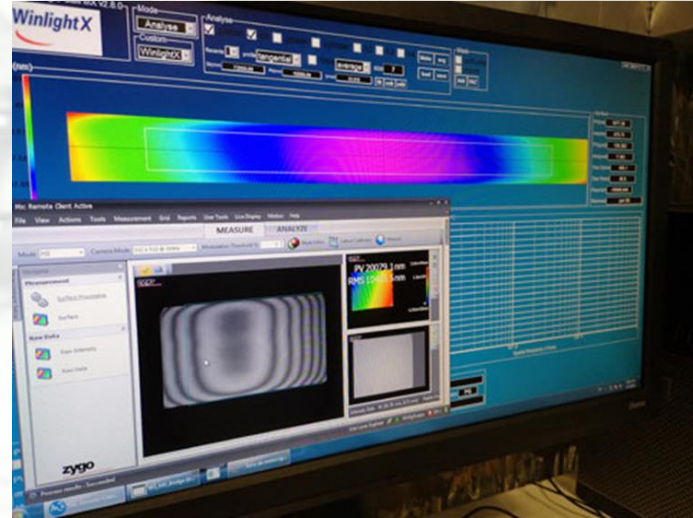
- ▲ Winlight is developing an upgraded stitching interferometry bench
- ▲ Winlight is working on a new polishing technology



OUTSTANDING ENVIRONMENT IS REQUIRED FOR OPTICAL METROLOGY

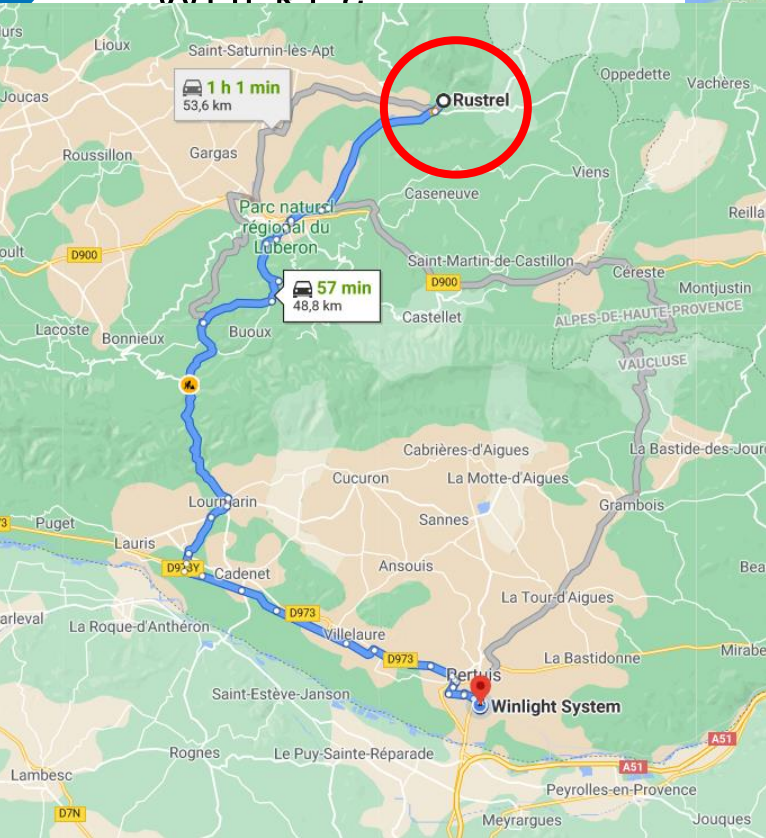


Stitching bench at Winlight



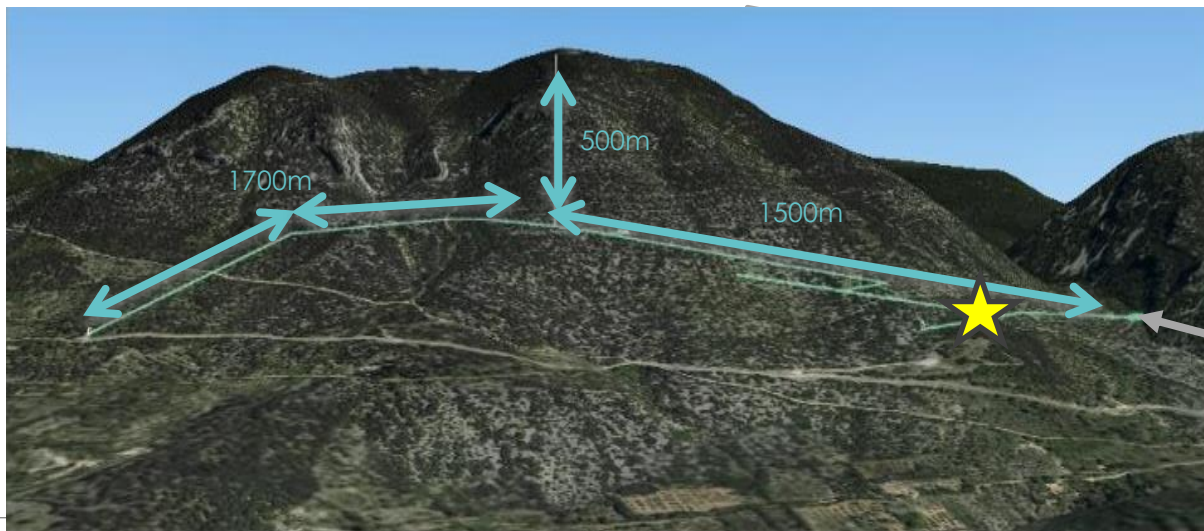
**DEAR SUB-NANOMETERS SEEKERS
LOOK UNDER THE MOUNTAIN !**

WHERE?



LOW-NOISE UNDERGROUND LABORATORY

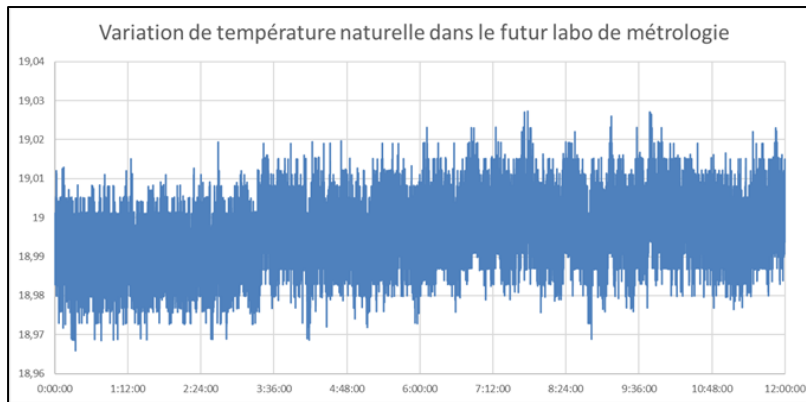
- ▲ 1h far from WINLIGHT
- ▲ More than 4km of horizontal galleries up to -500 m underground
- ▲ WINLIGHT is installing new metrology lab at - 60 meters underground to take advantage from exceptional environmental conditions



WHY LSBB? AN OUTSTANDING ENVIRONMENT

Great thermal stability

- No air-conditioning, natural thermal regulation



<< 50mK / day
is expected

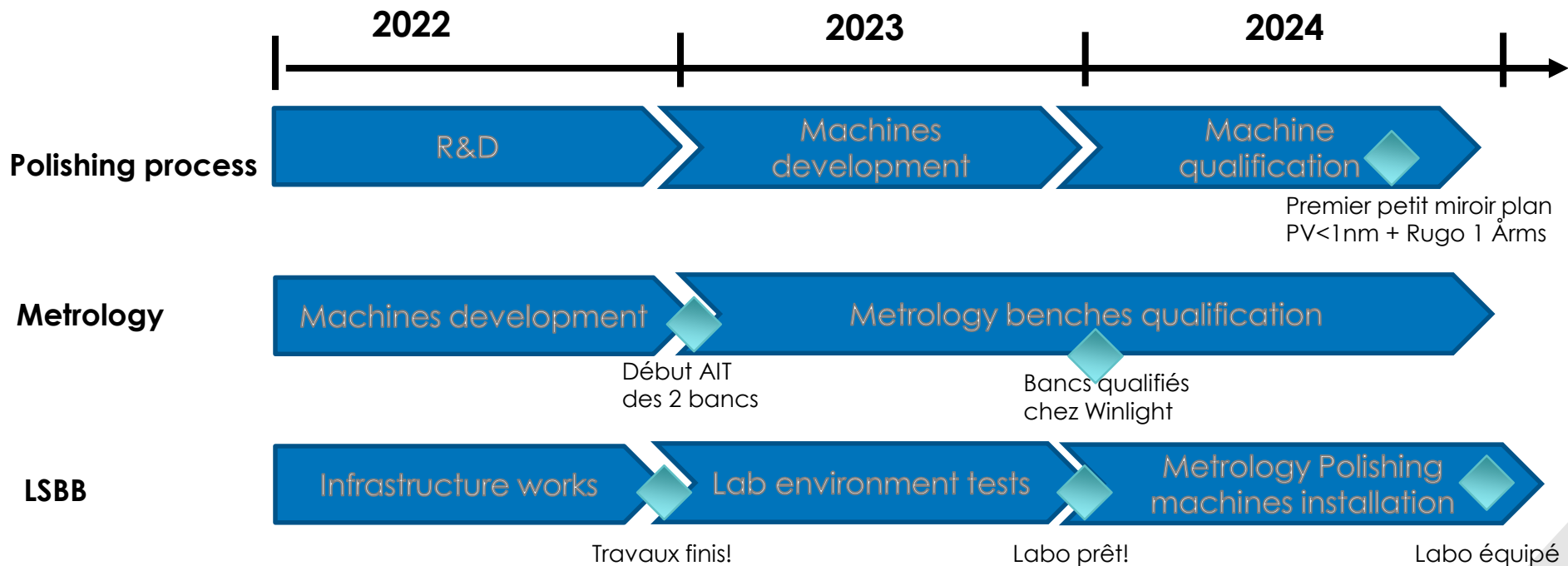
+ stable
atmosphere

Metrology room:
1 year : < 0.5 ° variation
Day: < 0.05° variation
1 hour: < 0.01° variation

One of the quietest worldwide site (used for seismic detection)

New polishing finishing process will also be installed there for thermal stability.

ROADMAP / MILESTONES



CONCLUSION

▲ See you @ NEXT i_DUST conference for (good) results 😊

THANK YOU

HISTORIQUE DES ÉVOLUTIONS

INDICE	DATE	MODIFICATIONS (raisons principales, paragraphes et pages concernés)	RÉDACTEUR / VÉRIFICATEUR
A	07/06/2022	Création	ECo