A NEW POLISHING TECHNOLOGY FOR MOST DEMANDING APPLICATIONS

SCALP

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BERTIN TECHNOLOGIES : SYSTEMS & INSTRUMENTATION

DETECT, OBSERVE, MEASURE

530
employees

92M€
2021 turnover

2021
Turnover 44M
200 staff

>50%
Of sales from export

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

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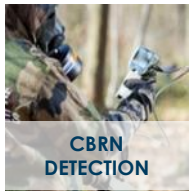
LIFE SCIENCES


NUCLEAR & HEALTH PHYSICS


CBRN DETECTION

Overview

Scientific instrumentation for life sciences & radiation detection

Examples

Radioprotection

Envir. Radiation Monit. systems

Precellys homogeniser

CBRN threat detection

bertin photonics

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bertin 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

bertin medical waste


MEDICAL WASTE

Leader in medical waste management systems

Sterilwave 250

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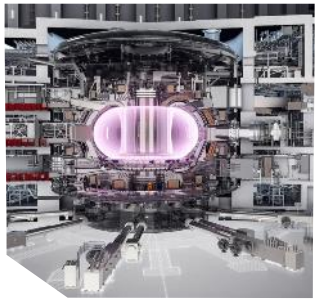
ACTIVITIES OVERVIEW

BIG SCIENCE

SPACE

ASTRONOMY

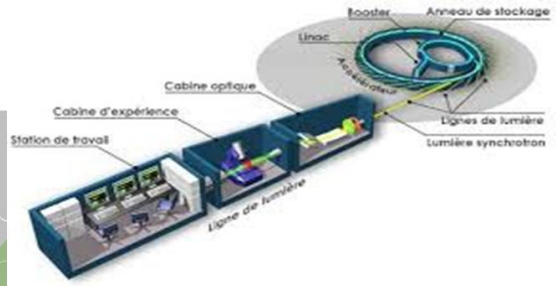


FUSION

SYNCHROTRON

DEFENSE

SYNCHROTRON : A LARGE MARKET DEMAND



Amérique du Nord

182 lignes de lumière opérationnelles
43 lignes de lumière à construire

Europe

221 lignes de lumière opérationnelles
15 lignes de lumière à construire

Asie

116 lignes de lumière opérationnelles
190 lignes de lumière à construire

Amérique du Sud

13 lignes de lumière opérationnelles
19 lignes de lumière à construire

Australie

9 lignes de lumière opérationnelles
8 lignes de lumière à construire

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

- The 10 largest synchrotrons are upgrading the machines (more power, better optics)
- A new generation of mirror quality is required with surface figure error < 1nm PtV

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BACKGROUND

- Worldwide renowned for high demanding optics manufacturing
- Design, manufacturing and integration of optical systems for space, atrophysics, fusion experiments (ITER, LMJ) and défence
- One of the world leader for X-ray silicon mirrors for synchrotrons
- Delivered 600 mirrors over the last 20 years
- Current surface error performance is limited to 10nm PtV

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SOFT CHEMICAL ANISOTROPIC LOCAL POLISHING ©

New polishing technology: R&D in progress

- Proof of concept OK

New high stability metrology lab

- Underground at LSBB

Target performance

- Roughness < 1Å rms
- Surface figure error < 1nm PtV
- Plane, elliptical, …

Mirrors available for synchrotrons in 23-24

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LSBB Laboratoire Souterrain à Bas Bruit
Low Noise Inter-Disciplinary Underground Science & Technology

ESRF

LABORATOIRE DE GÉNIE CHIMIQUE
TOULOUSE • UMR 5503

ICGM
Institut Charles Gerhardt Montpellier

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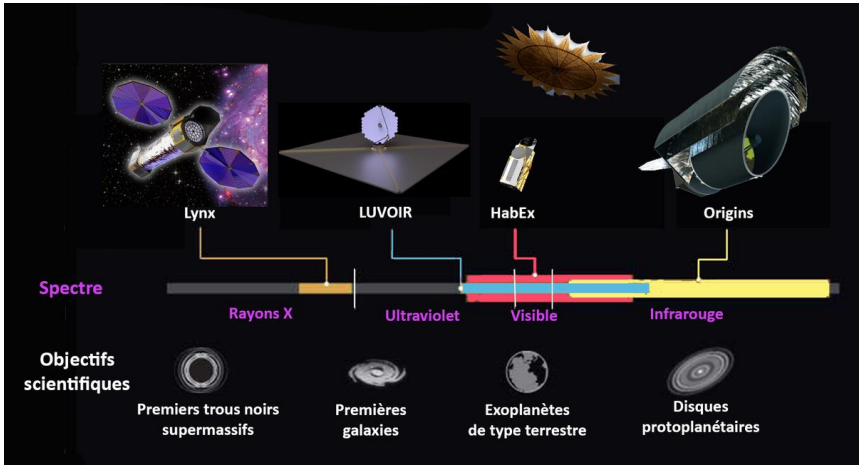
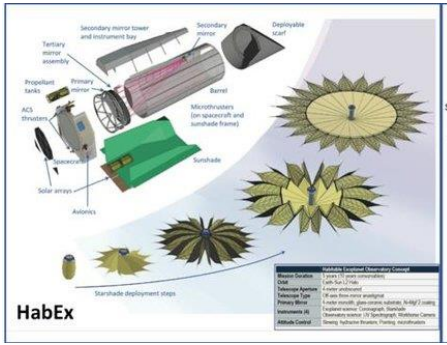
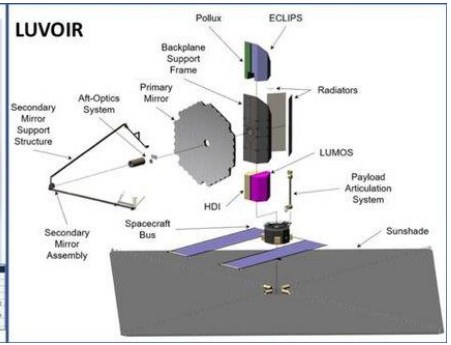
OTHER APPLICATIONS: ASTROPHYSICS

Created a LabCom with LAM to assess the potential of the technology for making the mirrors of future space missions (exoplanet detection)

- The US National Academies panel recommends that NASA Focus on Finding Life in the Galaxy, in its Decadal Survey on Astronomy and Astrophysics: top priority to the science of exoplanets and the search for life far beyond Earth.







PROJET FINANCÉ PAR L'ANR ANR PROJECT FUNDED BY THE ANR
LabCom NANO-PtoV

LAM LABORATOIRE D'ASTROPHYSIQUE DE MARSEILLE

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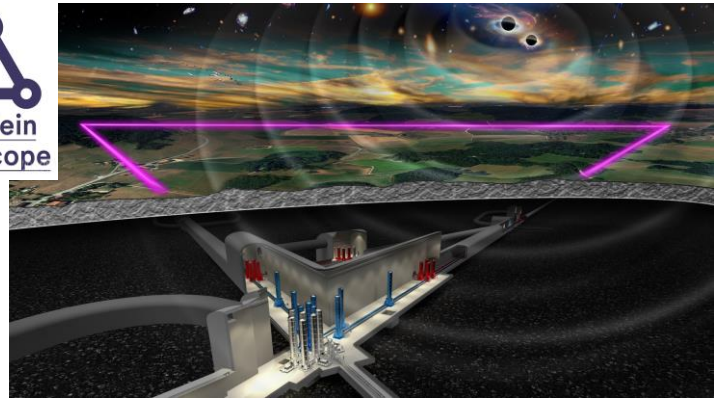
OTHER APPLICATIONS: ASTROPHYSICS

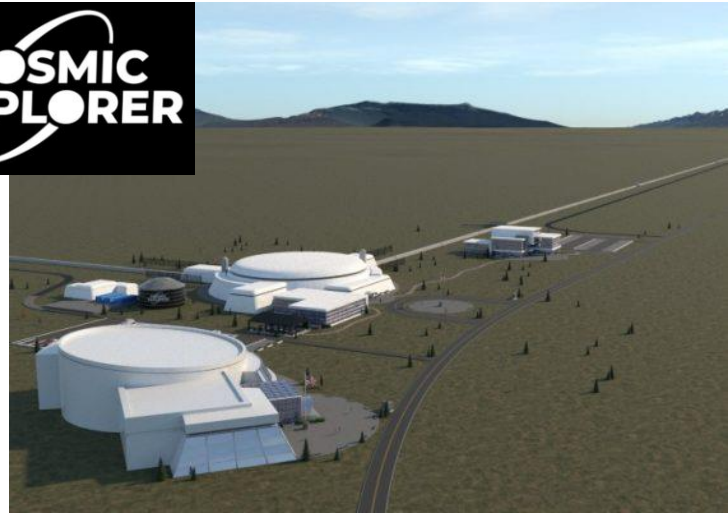
3rd generation gravitational wave detectors

- Einstein Telescope: approved for European Strategy Forum on Research Infrastructures (ESFRI) Roadmap 2021
  - 6 underground interferometers 10km long
  - 45-62 cm diameter mirrors
- Cosmic explorer
  - 2 interferometers 40 and 20km long
  - 70 cm diameter mirrors

Einstein Telescope



COSMIC EXPLORER



OTHER FUTURE POTENTIAL APPLICATIONS

Drawback:

- Relatively long process: not suitable for large production

Benefits:

- Super-polished mirror substrates of different materials including BK7, Fused Silica, ZERODUR, ZnSe, … are compatible
- Very low scattering: gyro lasers
- Very low absorption / low Laser Induced Damage Threshold : high power laser applications
- Complex shaped optics
- Phase masks
- Very thin optics


Thanks
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