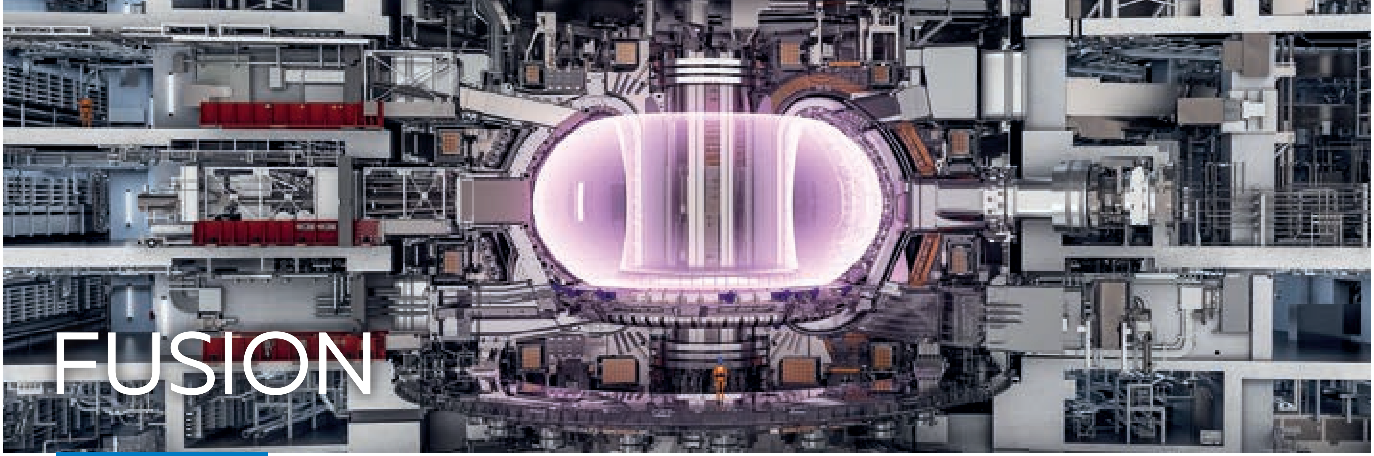
BIG SCIENCE

YOU IMAGINE, WE CREATE

Winlight

bertin

CNIM GROUP



FUSION

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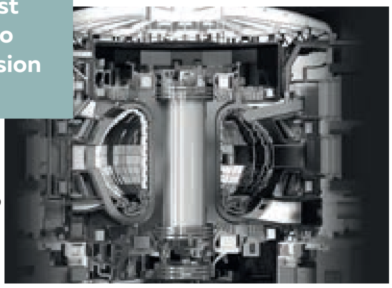
Large & high-accuracy manufacturing

ITER, the biggest machine to deliver fusion energy



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WHAT WE DID

D-shaped 14 x 9 m radial plates for the Toroidal Field coil magnets

HOW WE DID IT

/ Large 9 x 36 m portal machining center

/ Local vacuum electron beam welding

© F4E / ITER Org

WHAT WE DO

Divertor cassette body full-scale prototype

HOW WE DO IT

/ Material machining and welding for application under high radiation

1,600 tons of superconducting magnets on-site assembled

© F4E

FOCUS

SUPERCONDUCTING MAGNETS TO CONFINE SUPER-HOT PLASMA!

WHAT WE DO: Four out of six Poloidal Field Coils (PF Coils)

HOW WE DO IT: Set-up manufacturing activity, train and qualify operators

The unmatched ITER plasma power will be confined by gigantic superconducting which need to be produced on-site.

In Fusion for Energy's (F4E) PF Coils facility, CNIM is responsible for the on-going manufacturing and qualification of four PF Coils. Parts of the ITER magnetic confinement system is being produced with tailor-made tooling.

© F4E / CNIM

1 magnet = **8** workstations

18 months of manufacturing & test

6 to **8** km of Niobium-Titanium cable

400 tons

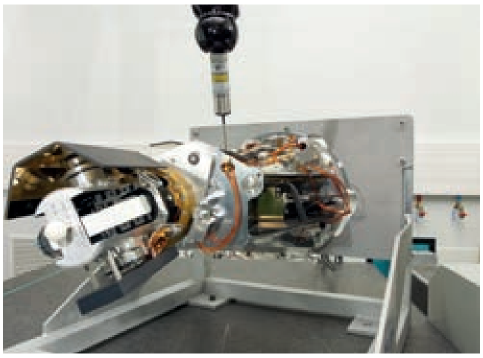

© CEA-MS

LASER

Complex systems & instruments for harsh environment

LMJ, the best-in-class laser fusion simulation facility


© CEA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WHAT WE DID
High-precision alignement system and plasma diagnostics

HOW WE DID IT
/ Very high stability and accuracy opto-mechanics


© CEA

WHAT WE DID
Remote handling systems

HOW WE DID IT
/ 8 tons payload platform design
/ Innovative omnidirectional wheels drive

FOCUS

176 LASER BEAMLINES TO IGNITE THE SUN ON EARTH!

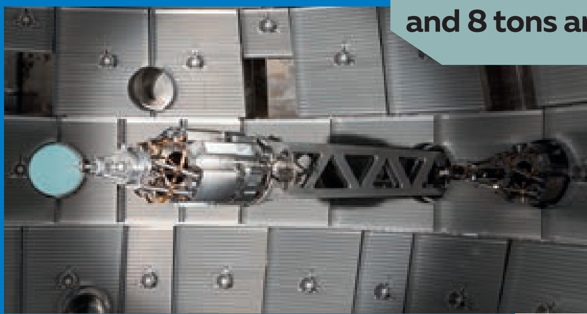
WHAT WE DID: LMJ Reference and Target Positioner

HOW WE DID IT: Theoretical models for high-accuracy mechanics, Integrated development of mechanicals arms and control systems

The success of LMJ highly depends on the target alignment accuracy with the laser beams. 176 beams aligned on a single target is a world premiere.

A close collaboration between CNIM/Bertin and the French Alternative Energies and Atomic Energy Commission (CEA) to analyze the physics challenges. This resulted in an innovative design a high alignment reliability and stability. This multi-year partnership delivered an operational with alignment system.

Target aligned at 20 µm with the 14.5 m and 8 tons arm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A temperature in excess of 100,000,000 degrees is reached in the heart of the target.

SPACE

© CNES

Flight proven optical payloads

TARANIS, 1st upper-atmosphere luminous flash observations satellite

© CNES

© Bertin / CNIM

WHAT WE DID

Active on-board subsystems photometer

HOW WE DID IT

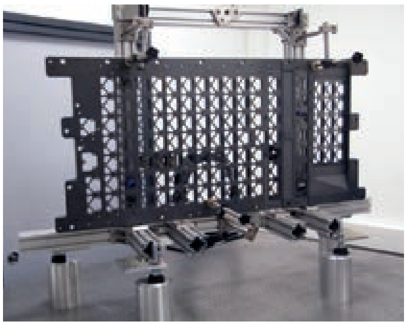
/ Equipment design for space use

/ Assembly, Integration, Testing and Validation (AITV)

Custom optical sensing structures

GAIA, chartering the 1 billion stars in our Galaxy, the Milky Way

© S. Brunier_ESO -ATG Medialab_ESA



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WHAT WE DID

CCD Support structure

HOW WE DID

/ Silicon Carbide ultra-accuracy polishing

FOCUS

LET'S HIKE ON MARS WITH CURIOSITY!

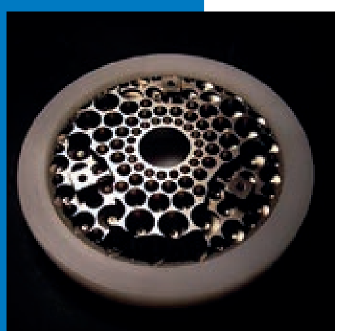
WHAT WE DID: Aspherically mirrors

HOW WE DID IT: Polishing qualified for space conditions

CHEMCAM, cutting-edge instrument analyses Mars rocks around the Curiosity rover. The instrument must perform remote analysis in rough terrains without complex rover motion.

9 meters distance for laser targeting

© J.L. Lacour / CEA / NASA



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Through a close collaboration with the Research Institute in Astrophysics and Planetology (IRAP) for NASA Jet Propulsion Laboratory (JPL), Winlight has designed this unique instrument's optics. World-class polishing capabilities and a seasoned Space expertise have made Winlight a partner of choice to manufacture CHEMCAM's optics.

A new Rover in 2020, Winlight will be on board again.

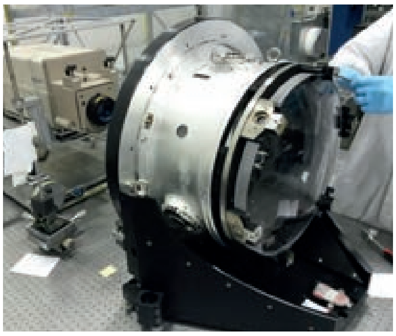
© iStock

ASTRONOMY

Complex optical systems

KITT Peak Observatory, the perfect sight-line to the stars

© P. Marenfeld & NOAO_AURA_NSF



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WHAT WE DID

4 Subaru Prime Focus Spectographs and 10 DESI spectrographs

HOW WE DID IT

/ High diameter aspherical lenses manufacturing

/ Lenses and mirrors integration on mechanical structure

High performance large manufacturing

VIRGO, detecting gravitational waves to comfort Einstein vision

© VIRGO COLLABORATION

© CNRS

WHAT WE DID

404 modules for vacuum chamber

HOW WE DID IT

/ Electron beam welding of thick and large components

/ Manufacturing for ultra-high vacuum level (clean room of 1,000 m²)

FOCUS

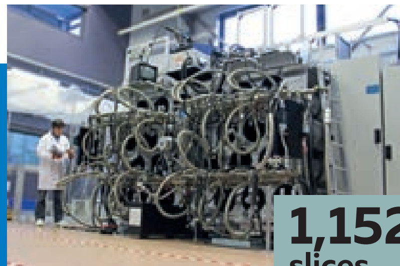
THE TIME MACHINE TO TRAVEL IN OUR UNIVERSE HISTORY!

WHAT WE DID: Slicers mirrors and spectrographs

HOW WE DID IT: Molecular Assembly, Industrialization for 24 slicers on MUSE

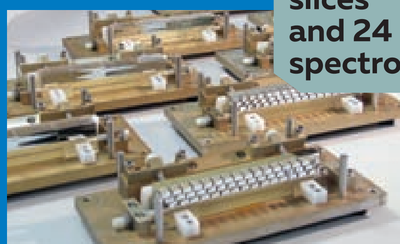
The Very Large Telescope (VLT) of the European Southern Observatory (ESO) takes the challenge of simultaneously performing wide range observation and local spectral analyses. This requires a novel instrumentation for a better understanding the universe evolution.

The Marseille Astrophysics Laboratory (LAM) and Winlight developed a genuine image slicing concept to enable simultaneous spectroscopic images. Winlight, the LAM and the National Scientific Research Council (CNRS) have jointly created a breakthrough and patented molecular assembly technology, then industrialized for repeat production.



© R. Bacon (CRAL) & ESO

1,152 slices and 24 spectros



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6 years of collaboration: challenge met!

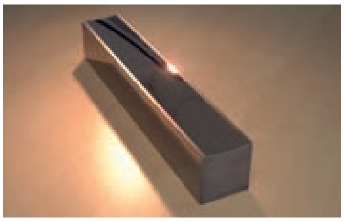
SYNCHROTRONS

© Pierre Jayet / ESRF

X-ray mirrors

ESRF, the world's most intense X-rays for research

© ESRF



WHAT WE DID

X-ray mirrors (toroids, cylinders)

HOW WE DID IT

/ Design, manufacture and polish components for X-ray applications, roughness down to 0.12 nm, including mirrors of various shapes

Benders, positioners & vacuum vessels

SOLEIL, the renown multi-purpose facility

© SOLEIL

WHAT WE DID

Beamline systems

HOW WE DID IT

/ Cooled X-ray mirrors and benders within vacuum vessels

FOCUS

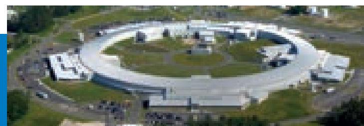
NEVER ACHIEVED DISCOVERIES AT THE NANOSCALE LEVEL!

WHAT WE DID: Integrated subsystems for X-ray beamlines

HOW WE DID IT: Superior quality very long X-ray mirrors production, Integration in ultra-high vacuum vessel

Delivering ultra-high precision matter images at the nanoscale level requires beyond state-of-the-art X-ray beam concentration. This is the objective for the National Synchrotron Light Source II (NSLS II) in Long Island, USA.

Winlight has met the challenge raised by the Brookhaven National Laboratory (BNL) to deliver longest ever polished X-ray mirrors and to integrate them in a turnkey vacuum vessel.



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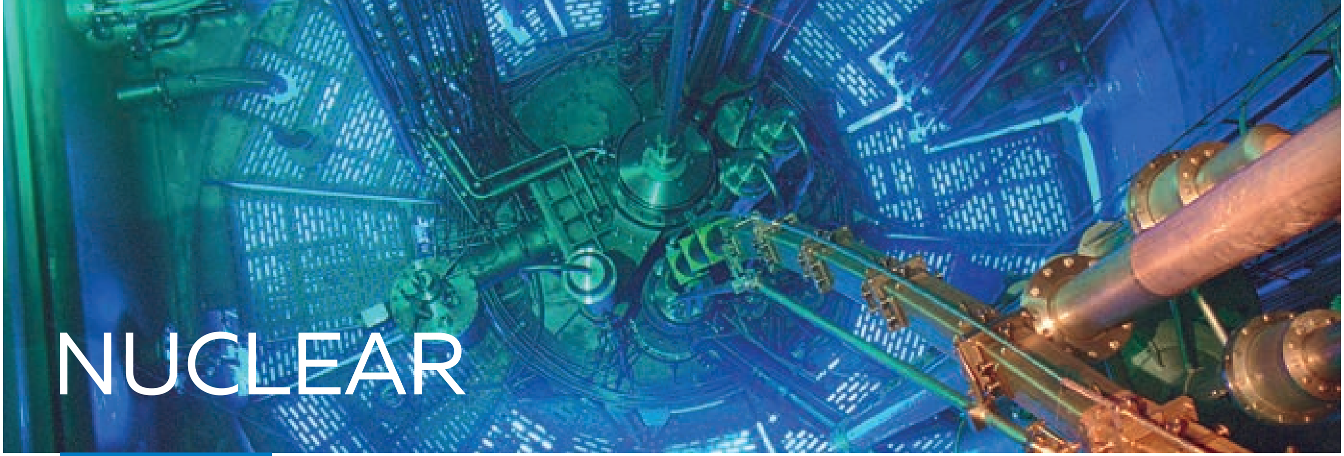
Up to 1,500 mm long mirrors

Come and visit the Brookhaven facility, it's impressive!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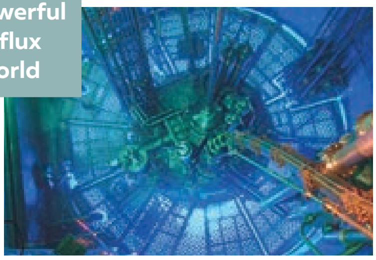
NUCLEAR

Advanced critical manufacturing

ILL High-Flux Reactor, the most powerful neutron flux in the World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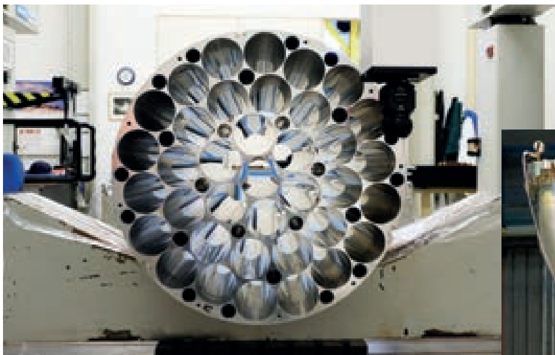
WHAT WE DID
Beam tubes

HOW WE DID IT
- / Complex vessels manufacturing with nuclear RCC-MX codes
- / Electron beam welding of Ag3NET aluminum

Cutting-edge complex reactor vessel

JHR, the expected research reactor


© CEA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8 m height, 0.7 m diameter and 20 tons

FOCUS

BOOSTING NUCLEAR TECHNOLOGIES OF THE FUTURE!

WHAT WE DID: Nuclear vessel reactor

HOW WE DID IT: Inox and aluminium welding, Oil free metal machining

The Jules Horowitz Nuclear Reactor (JHR) is necessary to experiment tomorrow's nuclear technologies. This facility must incorporate a safe reactor vessel that can accommodate up to twenty simultaneous experimentations. Such reactor vessel has never been engineered so far.

CNIM manufactured a neutron-resistant reactor with complex materials such as aluminum, welded in 3D shaped thick parts. CNIM has closely worked with the French Alternative Energies and Atomic Energy Commission (CEA) to adapt its processes to the demanding and nuclear standards. Currently CNIM is assembling the reactor within its facilities and will install it on-site.

Medicine is waiting for the JHR to produce high quality radioisotopes.

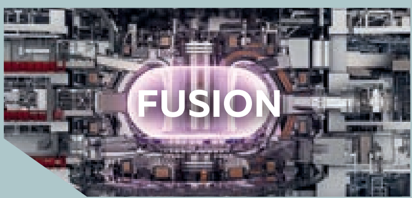
BIG SCIENCE

Combining technical expertise and world class engineering and manufacturing, CNIM Group with its subsidiaries Bertin and Winlight deliver superior quality equipment and turnkey systems.

Ultra-high precision optics, specialty material assembling and complex system integration make our offering unique. We cater to most daunting Big Science challenges, being involved in high visibility projects worldwide.

CNIM Group is your partner of choice from early concept stages, through close collaborations with leading scientific teams, to create innovative equipment. Flexibility, imagination, performance-driven spirit are spurring our intent to advance Big Science.

Just imagine. We create.



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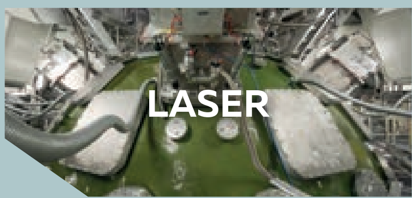

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