

# OPTOSIGMA EUROPE

OSE overview for Max-Planck-  
Institut für Astronomie

# Company Profile



- Technical Facilities in Japan
- Technical Facilities & Offices Worldwide
- > 500 Employees Worldwide
- Turnover > 100 M€

## OptoSigma Facilities

'Close to our Customers !'

- Sigma Koki / Parent Company (Japan): 1977
- OptoSigma Corporation (USA): 1995
- OptoSigma Europe (France): 2014
- OptoSigma South East Asia (Singapore): 2019

# Technical Facilities in Japan

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## **Hidaka Facility – 70,000 Sq. Ft. (6,500 m<sup>2</sup>)**

Systems, Optical Assemblies, Optics & Coatings, Design  
Bio-Medical Applications Certified



## **Noto Facility – 43,000 Sq. Ft. (4,000 m<sup>2</sup>)**

Opto-Mechanics, Clean Room Assembly, Design



## **Technology Center – 16,000 Sq. Ft. (1,500 m<sup>2</sup>)**

Systems, Optical Assemblies, Optics & Coatings, Design





# Technical Facilities and Offices Worldwide

## **OptoSigma America- 15,500 Sq. Ft. (1450 m<sup>2</sup>)**

Optical Coating Design, Opto-Mechanical Assembly



## **OptoSigma Europe- 5,500 Sq. Ft. (510 m<sup>2</sup>)**

Optical Design, Optical Assembly



## **Sigma Koki Shanghai- 34,000 Sq. Ft. (3200 m<sup>2</sup>)**

Optics and Opto-Mechanics, Volume Manufacturing



## **OptoSigma SEA- 200 Sq. Ft. (20 m<sup>2</sup>)**

System R&D, System Assembly

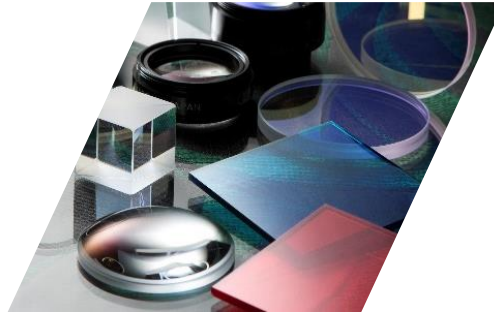


# What do we manufacture?

19 000 +  
Standard Products

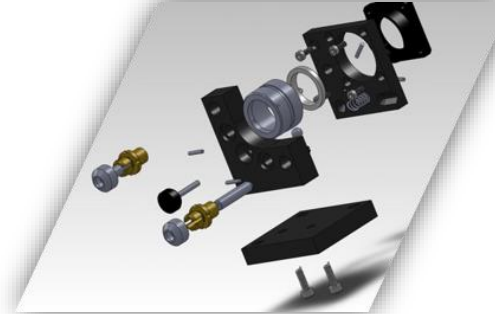
## Optical components

- Lenses
- Mirrors
- Windows
- Beamsplitters
- Filters



## Opto-Mechanics

- Lens Holders
- Kinematic Mirror Mounts
- Gimbal Holders
- High Stability Mounts
- Automatic Shutters



## Optical Systems

- Objectives
- Microscope Units
- Laser Beam Expanders
- F-Theta Lenses
- Laser Cavity



## Positioning

- Manual Stages
- Motorized Stages
- Linear Stages
- Rotation Stages
- Actuators

## Optical Coatings

- High Reflectivity
- AR Coatings
- Metallic, Dielectric
- Laser Line, Broadband, Multi-band
- UV, NUV, VIS, NIR, IR, DIR
- IBS, IAD



## Lab Equipment

- Optical Tables
- Optical breadboards
- Laser Safety
- Optical Rails
- Optical Posts, Bases etc.
- Optical Power Meter

# Innovation

## New Products

- MHX
  - Best cost-efficient High Stability stainless steel Mount on the Market

## Better Specs

- Super Mirrors
  - 99,999 % Reflectivity

## New Systems

- OptoNano
  - Best cost-efficient nanoscale imaging system (100 nm - 200 nm | 40k \$)

## Motion Control

- OSCM Series
  - X Z A Motorized stages w/ 25 mm x 25 mm top

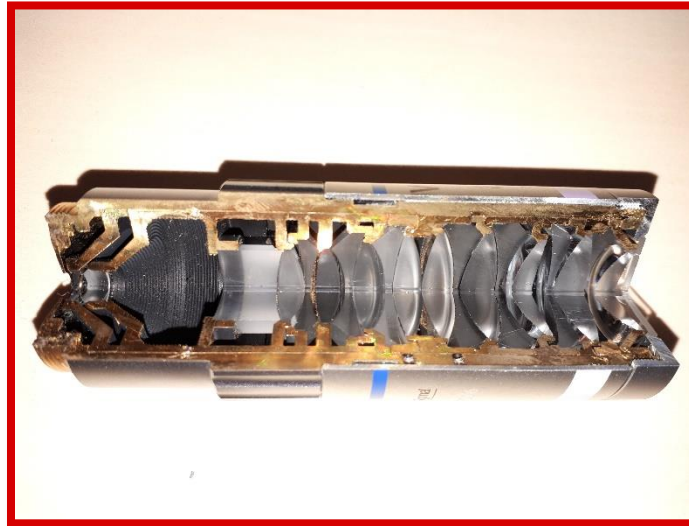


# Product Example : Objectives

Home made!

VIS-IR & UV range

High Magnification  
High NA



Long Working  
Distance

Magnification	NA	Working Distance	Pricing
Up to x100	Up to 0.70	Up to 40mm (@ 550 nm)	From <b>400 €</b> to 11k €



# Product Presentation : MHX (High Stability Mirror Mount)

High Stability

Center Post Mounting



Material:  
Stainless Steel

Unit Price:  
102.00 € (25.4 mm)!

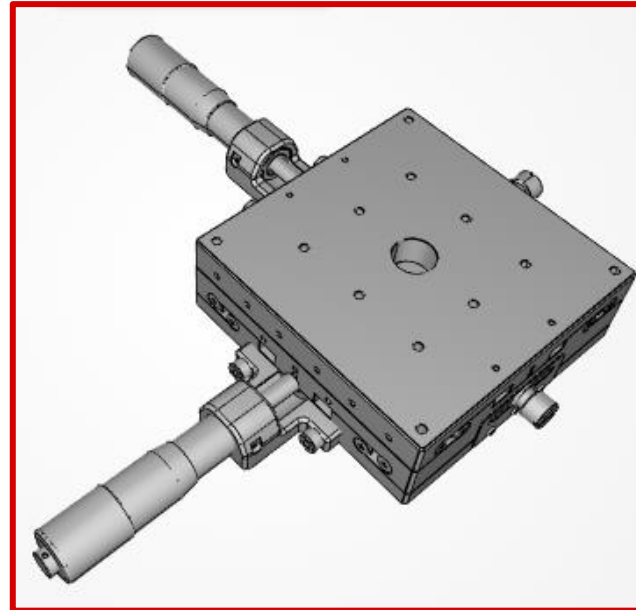
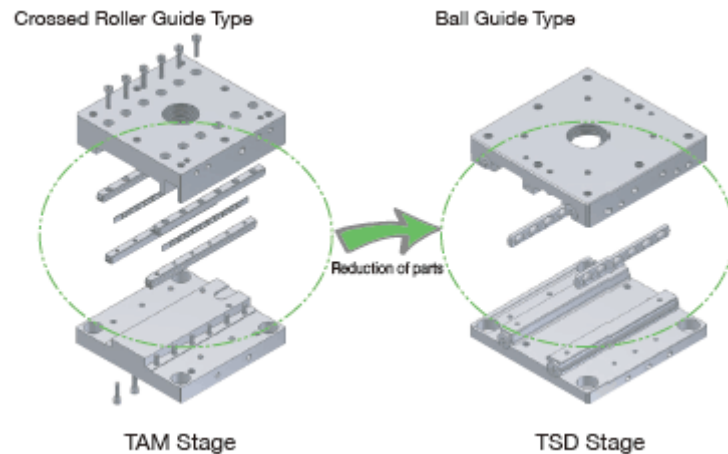
Optics Dimensions	Angle Range	Compatible Thickness	Thermal repetability	Options
½ inch 1 inch 2 inch	± 3°	3 mm – 6 mm	@ Delta 10 °C Thermal Cycle: ≤ 1.5 µrad	Locks and Adjusters



# TSD & TADC: Extended Contact Ball Bearing Manual Stage

Higher Stability

Best Performance



Less Screws




Top and Bottom cut from the same metal piece for more stability

Explanatory Video :

[https://www.youtube.com/watch?v=g3\\_ZFARInUE&ab&ab](https://www.youtube.com/watch?v=g3_ZFARInUE&ab&ab)

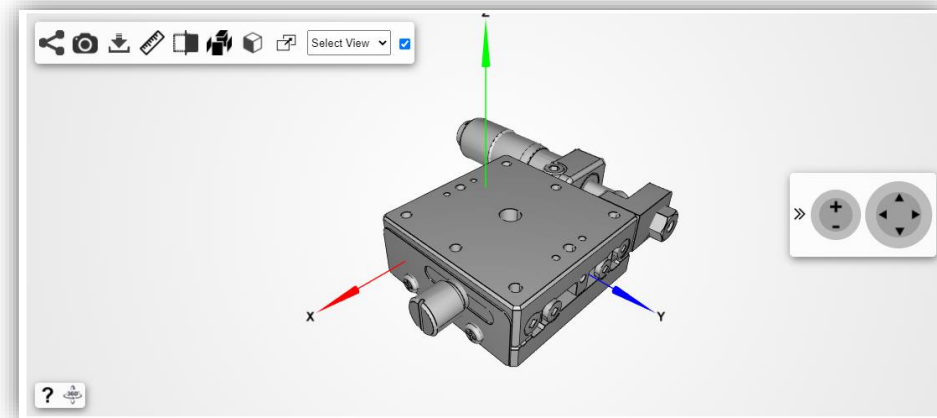
# Online Website






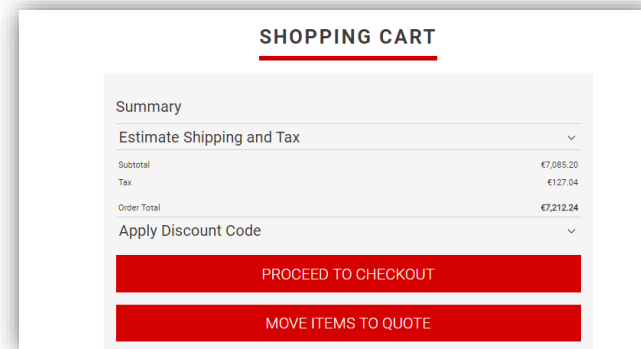
-  +19 000 Products & Prices Online
-  Technical Drawings & Datasheets
-  Online Chat Support



-  NEW FEATURE : Interactive Search Bar!
-  NEW FEATURE : Online 3D Drawings



-  Create your Account
-  Request a Quote
-  Purchase Online



# What can we do for you?

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- Stocking after your individual wishes.
- Access to a wide range of materials.  
Even if a material is not available, you can provide us with your wished one.
- Quality control, environmental testing, etc., after your individual requirements.
- Complete design, specs definition, supply chain, from scratch on.

***Our optical engineers have decades of experience,  
and are happy for intensive discussions about your  
optical designs.***

# Custom Products

Custom is part of OptoSigma DNA

Custom Opto-Mechanics & Motion Control Assemblies

+40 Years of Experience in Manufacturing optics



- For Systems :
  - ✓ Prototyping
  - ✓ Optical and OptoMechanical Design
  - ✓ Assemblies
- For Optics :
  - ✓ Coating
  - ✓ Dimensionning
  - ✓ Polishing
- **Small & Big Batches**

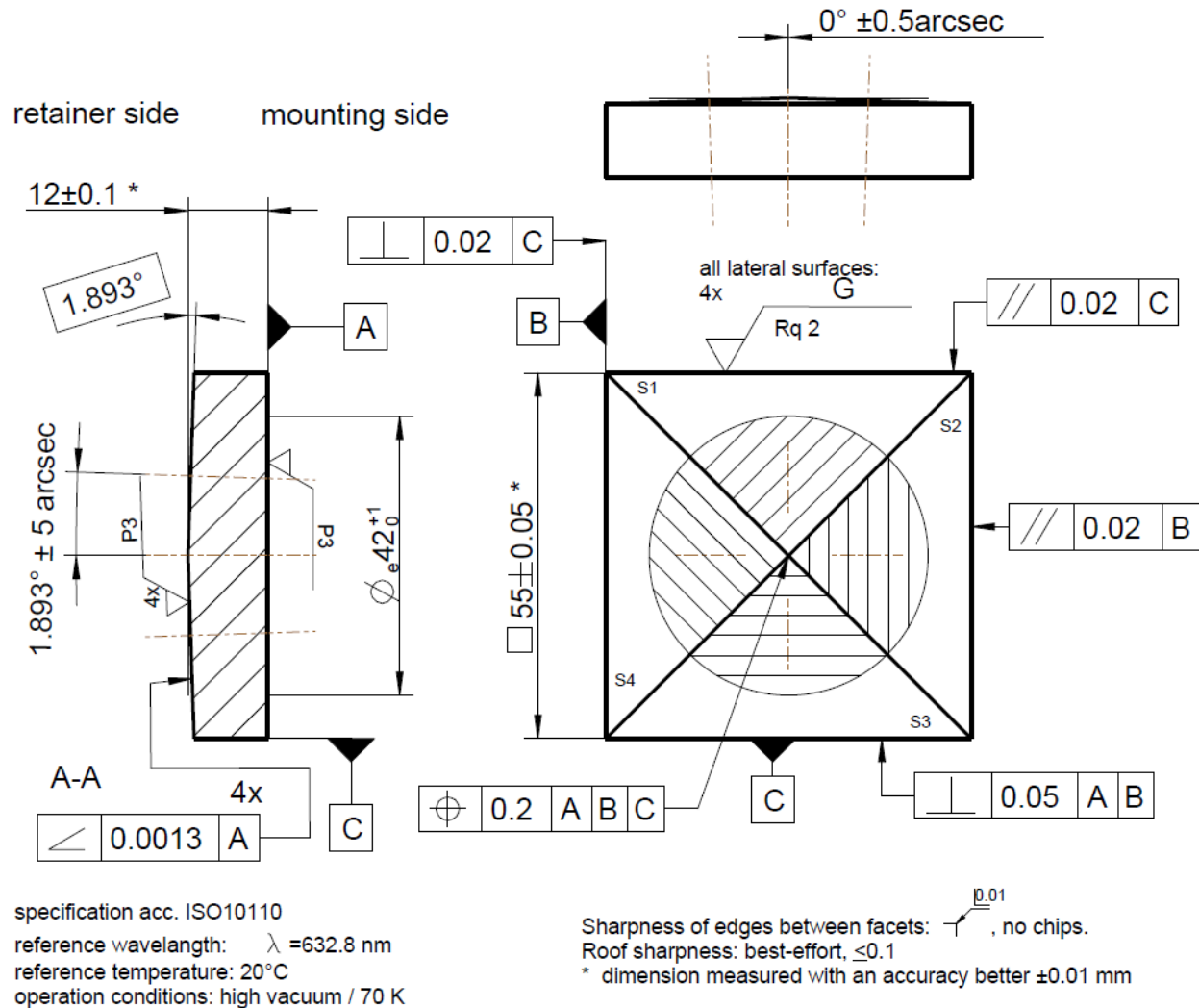




# Custom Pyramid Prism

- Material: Infrasil 301 or S-FPL55
- AR optimized for 1.4  $\mu\text{m}$  to 2.5  $\mu\text{m}$
- Polishing:  $R_q < 1.5 \text{ nm RMSi}$

Front surface	Material	Rear surface
<p>R: 4x Plano, pyramid angle: 1.893 deg</p> <p><math>\phi_e</math>: 42 <math>^{+1}</math> mm</p> <p> AR: optimized 1.4 - 2.5 <math>\mu</math>m</p> <p>For each plano facet S1, S2, S3, S4:            3/ — RMSi &lt; 15 nm (inside the corresponding part of <math>\phi_e</math>)            4/ 5" A            5/ 5x0.1; C5x0.1</p> <p>Polished: Rq &lt; 2nm RMS</p>	<p>Glass: Infrasil 301</p> <p><math>n_d = 1.4589 \pm 1 \cdot 10^{-5}</math>  <math>\nu_d = 67.8 \pm 0.2\%</math></p> <p>0/ 5            1/ 1x0.16            2/ 2;5</p>	<p>R: Plano</p> <p><math>\phi_e</math>: 42 <math>^{+1}</math> mm</p> <p> AR: optimized 1.4 - 2.5 <math>\mu</math>m</p> <p>3/ — RMSi &lt; 30 nm (all <math>\phi</math> 34),            RMSi &lt; 15 nm (all <math>\phi</math> 17)            4/ -            5/ 5x0.1; C5x0.1</p> <p>Polished: Rq &lt; 2nm RMS</p>



## LISA PATHFINDER

APC | NASA | ESA | UDT

OptoSigma provided the APC (Astroparticules and Cosmology Lab at the University of Paris) **custom optics**.

This to realize the first optical bench for the detectors. This optical bench will be the basis of the real optical path included in the detector.

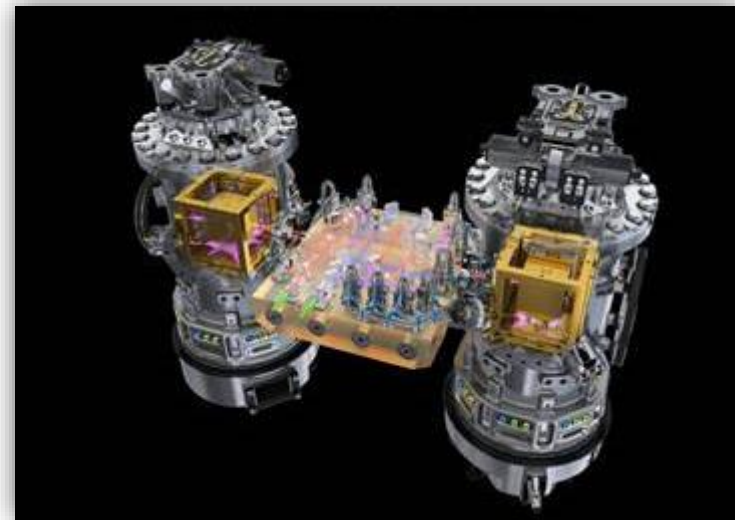


Lisa Pathfinder is a cosmologie project initiated in the 70's with the goal to detect and analyze gravitaional wave using 3 satellites in space. The satelittes will be separated by 2,5 Million km.

The idea is to have this triangle of satelittes following earth in an orbit around the sun.

By using a laser to analyze the distance between the satelittes with picometer precision. We will be able to detect gravitational waves.

It works around the same principle as LIGO in the US.



# JASMINE Project



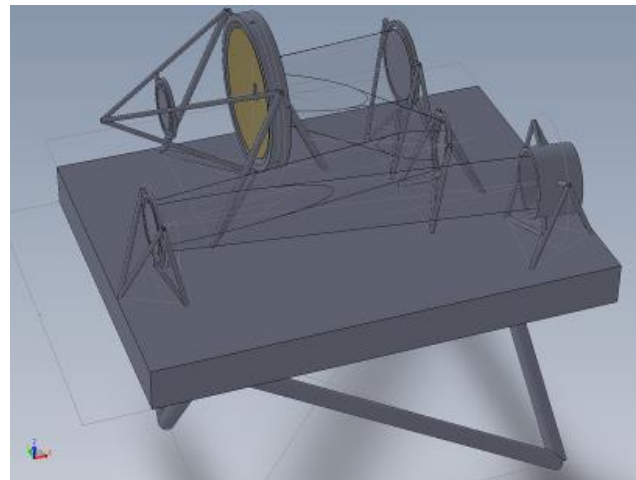
## Mirrors for Jasmine Project

JAXA

- Sigma Koki is working with National Astronomical Observatory of Japan
- Providing Precise Large ( $\phi 220 \sim \phi 310\text{mm}$ ) Mirrors to be mounted on Small-JASMINE Satellite
- Measuring the distances and apparent motions of stars at Near-infrared ( $1.1\mu\text{m} < \lambda < 1.7\mu\text{m}$ )  
<http://www.nao.ac.jp/en/project/jasmine.html>

### Small-Jasmine Specifications

- Primary Mirror: 300 mm
- Size/Weight:  $(50\text{ cm})^3$ , 400 kg
- Operation: 2018 - 2020 (target)



# LIGO

## Laser Interferometer Gravitational-Wave Observatory

LIGO / NSF / MIT

OptoSigma provided LIGO our custom motorized translation stages.

They are now incorporated within the interferometer arms.

These are custom configured, multi-axis, motorized translation stages and controllers

The Laser Interferometer Gravitational-Wave Observatory was built for 1995 to 2002.

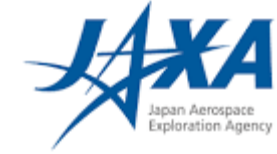
It consists of two interferometers, each with two, 4 km(2.5 miles)", long arms arranged in the shape of an "L".

These instruments act as 'antennae' to detect gravitational waves.

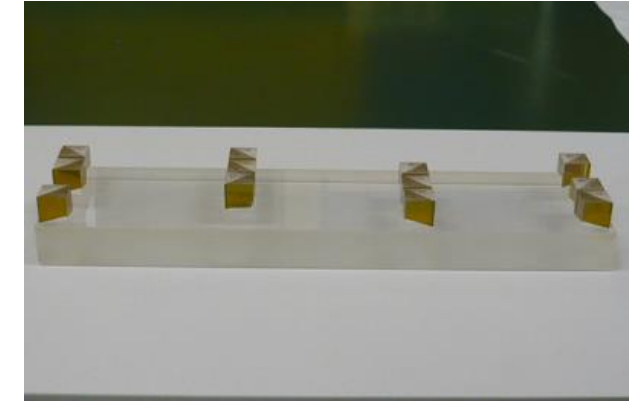
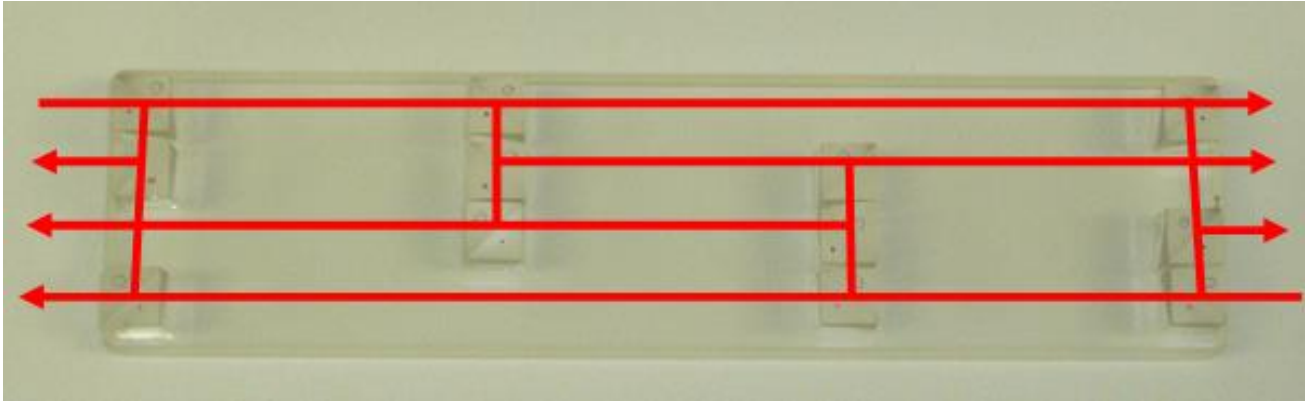




# ASTRONOMY for JAXA 1



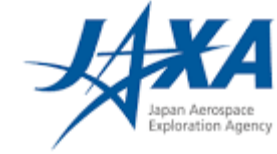
Delivered an optical module system for a satellite



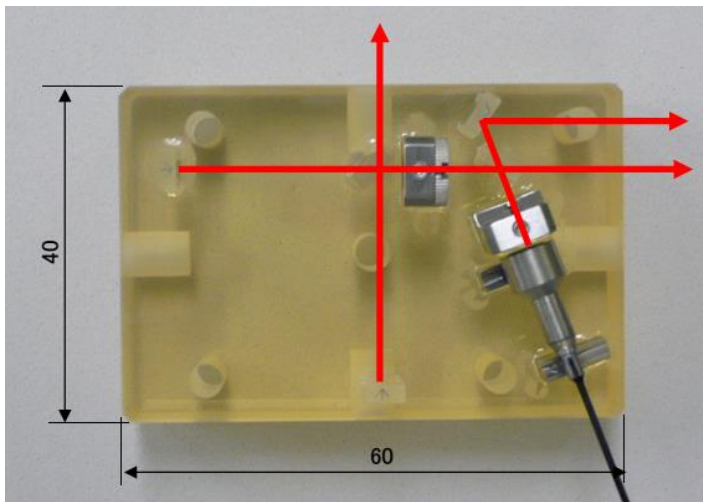
## Astronomical Measurement System

This is an optical element for basic verification of thermal deformation monitoring. It multiplexes and demultiplexes the laser light input from 2 directions and outputs from 6 directions. 12 mm Beam Splitter is mounted onto a 200 mm × 50 mm base plate at the optimum position and angle.

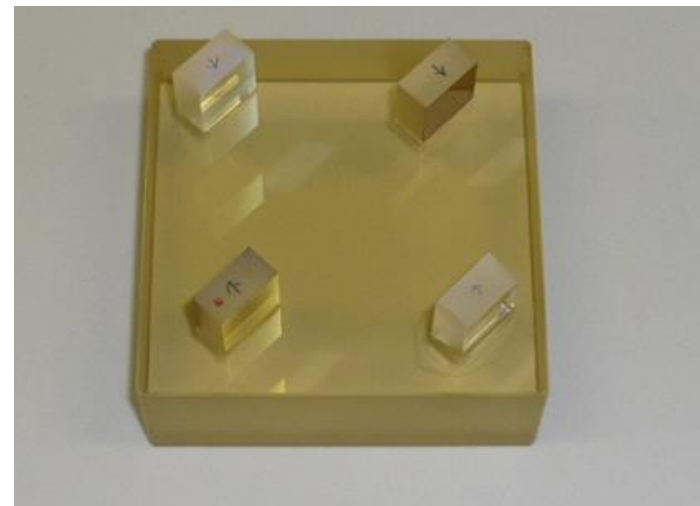
# ASTRONOMY for JAXA 2



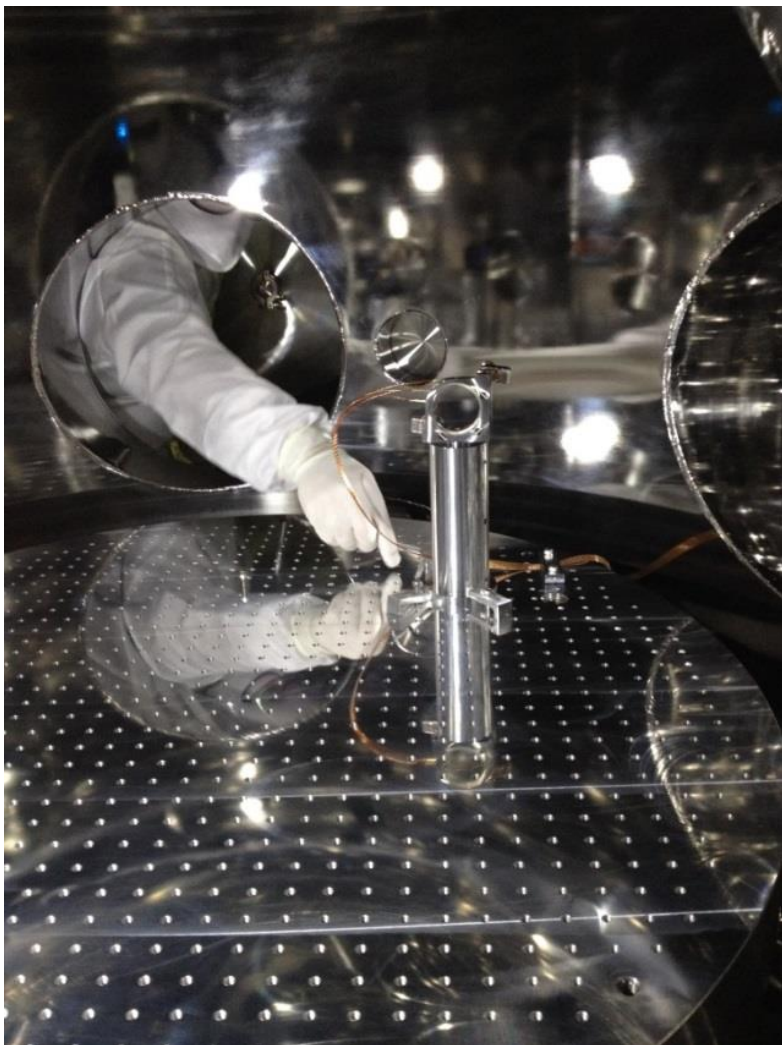
Delivered 2 compact metrology interferometer optical module systems to be boarded onto Satellite



Michelson interferometer module  
40 mm x 60 mm  
Optics size 3 mm to 6 mm



Mach-Zehnder interferometer  
module  
30 mm x 30 mm  
Optics size 8 mm to 10 mm

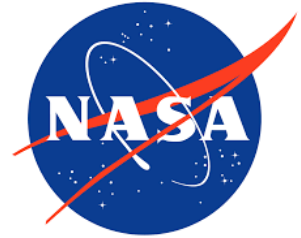


Be part of the Discovery of the gravitational wave signal by delivered optics & optomechanics component to be used in ultra high vacuum environnement.

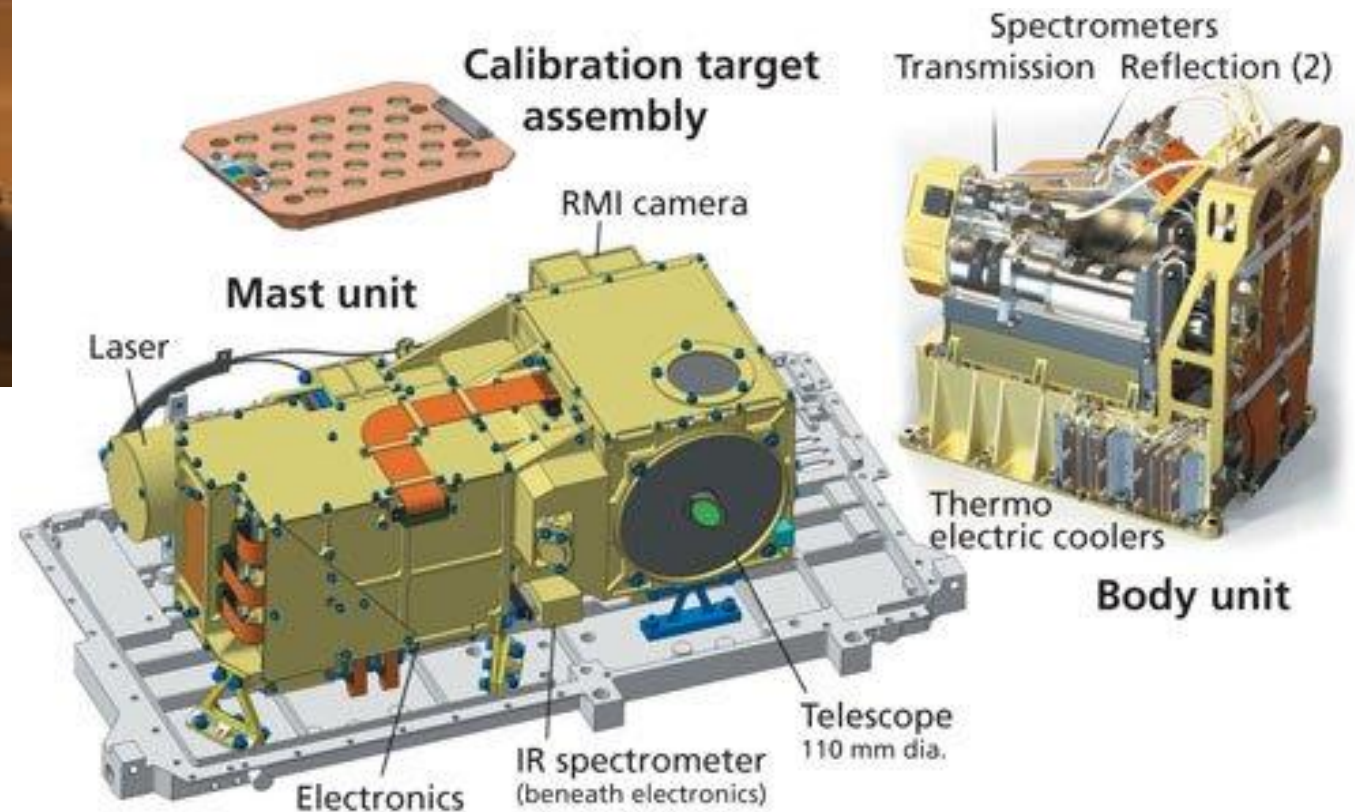




# SuperCam Project



SuperCam in addition performs Raman spectroscopy at 532 nm to investigate targets up to 7 m distance from the rover, Time-Resolved Fluorescence (TRF) spectroscopy, Visible and InfraRed (VISIR) reflectance spectroscopy (400 – 900 nm and 1.3 – 2.6  $\mu\text{m}$ ) to provide information about the mineralogy and molecular structure of probes from rocks on Mars. It will also be able to search directly for organic materials.

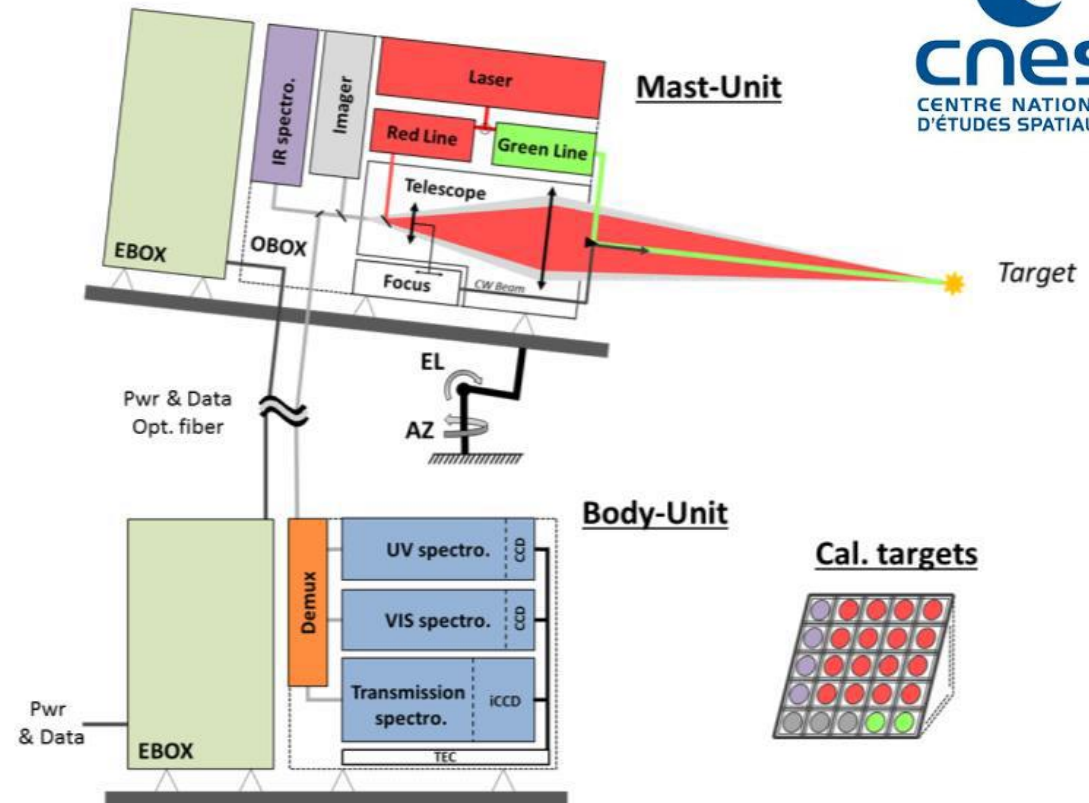




# SuperCam Project



The SuperCam instrument is an evolution from the successful ChemCam instrument on MSL-Curiosity. In addition to the existing geologic capabilities (Light Inducted Breakdown Spectroscopy), a new RAMAN biologic spectroscopic analysis is implemented, coupled to an IR spectrometer.



# SuperCam Project



This is one of  
the sample  
specifications  
that  
OptoSigma  
has fulfilled

OptoSigma provided to SuperCam Project the following components

#	Name
1	Red expander – relay mirror 1
2	Green expander - relay mirror 1
3	Green expander - relay mirror 2
4	Telescope-Schmidt Relay mirror
5	Red expander - R/G dichro
6	Green expander -CWL dichroic
#	Name
1	Objective-laser dichroic
2	Objective - Imager dichroic
#	Name
1	Objective – Lens 1
2	Objective – Lens 2
3	Objective – Lens 3
4	Objective – relay mirror
5	Beam splitter – IR lens
6	Beam splitter – Central lens
7	Beam splitter – BU fiber connector – lens
8	AF assembly- lens

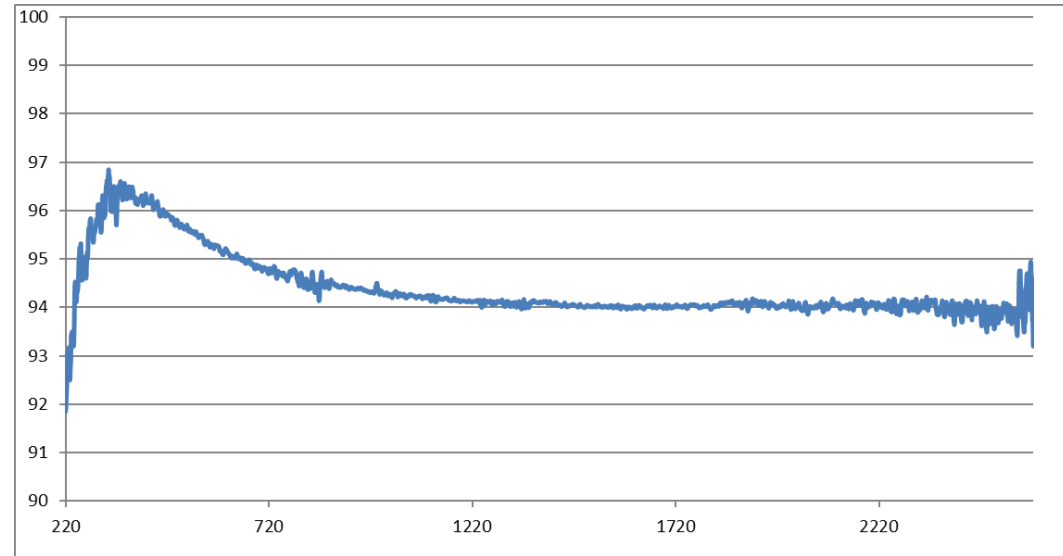
Mechanical dimensions	Rectangle 10x10 mm +/- 0.1 mm
Useful Zone	Circle 7 mm diameter, centered at +/- 0.5 mm
Central thickness	3 mm +/- 0.1 mm
Material	Fused Silica Corning 7980 or Fused Silica Low-OH Corning 8655
Front Face	Flat, $\lambda/8$ PTV @633 nm
Rear Face	Flat, grinded
Wedge	< 3 arcminutes
Scratch – dig	20/10
Rugosity Front face	2.5 nm RMS
Coating on Front Face on useful zone	<b>Hard coating</b> R> 99.5% @532 nm (linear polarization S) and 1064 nm (random polarization). Incidence 45° Laser impulsion 4ns, 30 mJ @1064 nm, 15 mJ @532 nm, 10Hz frequency. Laser size 2.3 mm @ 1/e <sup>2</sup> (Gaussian profile)
Cleanliness	Particles: ≤100 ppm Molecules: ≤1.0 10 <sup>-7</sup> g/cm <sup>2</sup>
Protective chamfers	0.2 mm max. width at 45°

# SuperCam Project



OptoSigma provided to SuperCam Project the following components

#	Name
1	Green expander - divergent Lens
2	Green expander - convergent lens
3	Red expander - divergent lens
4	Red expander - convergent lens



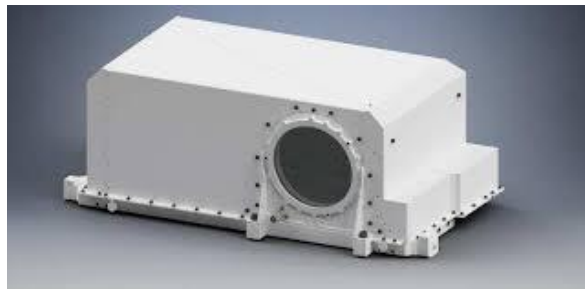
This is one of the sample specifications that OptoSigma has fulfilled

RWEB Windows Plate(SCAM-30000-IRAP-SP-00607)

Coating on Both Surface:

MgF<sub>2</sub> single layer anti-reflection coating  
T > 93 % @ 245 nm & 2600 nm, Center

Wavelength: 400 nm



#	Name
1	Periscope lens 01
2	Periscope folding mirror 01
3	Periscope lens 02
4	Entrance Folding mirror
5	Collimator lens
6	Objective lens

Set of IR optics  
Made by  
ZnSe

# SuperCam Project



## Some usage Conditions on Mars... to know

Storage, transportation and on-ground tests

Storage and transportation in a controlled environment at ambient temperature (5 – 50°C) and ambient humidity (30% <HR< 70%) for 5 years.

The nominal exploitation phase on Mars will last 1 Martian year, i.e. 670 Martian days (sols) or 687 terrestrial days. The goal of the science team is to operate the SuperCam for, at least, 3 Martian years (called here “extended mission”). SuperCam will be operated 2 hours a sol, when temperature permitting.

The DEVICE shall not degrade the functions or performance after 10,000 switches ON/OFF, or actuations.

Ground for a maximum duration of 5 years. The DEVICE will be switched on for tests and calibrations in class 100,000.

During the cruise (about 10 months), in vacuum, the DEVICE will stay off. Upon special request, potential sequences of ON/OFF are possible, when temperature permitting.

Earth to Mars cruise

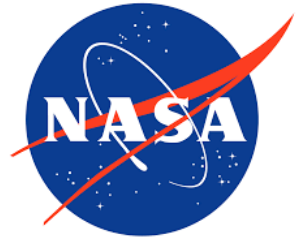
The DEVICE shall not degrade its functions or performance during the entire nominal mission (670 sols), and be functional up to the end of the extended mission (2010 sols).

Life Time

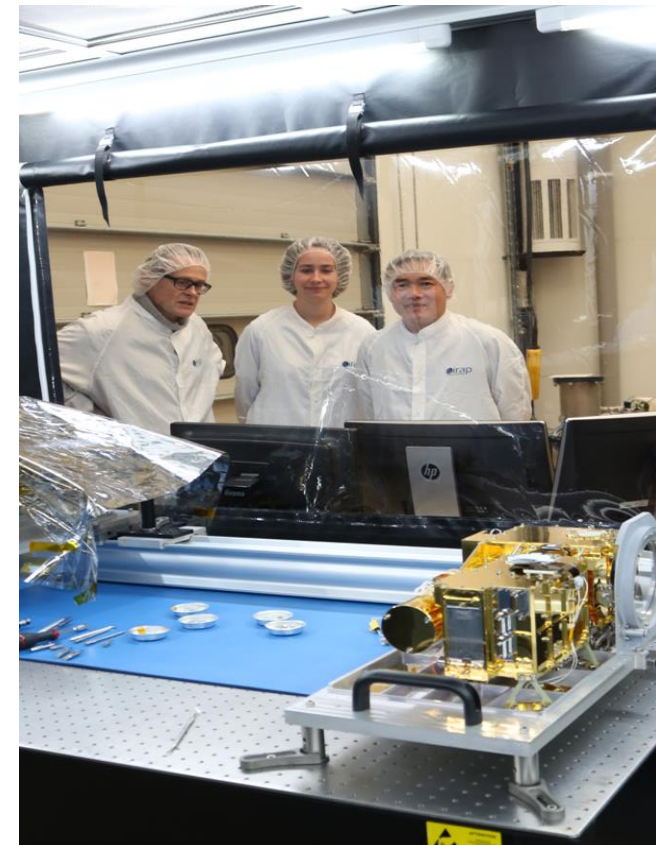
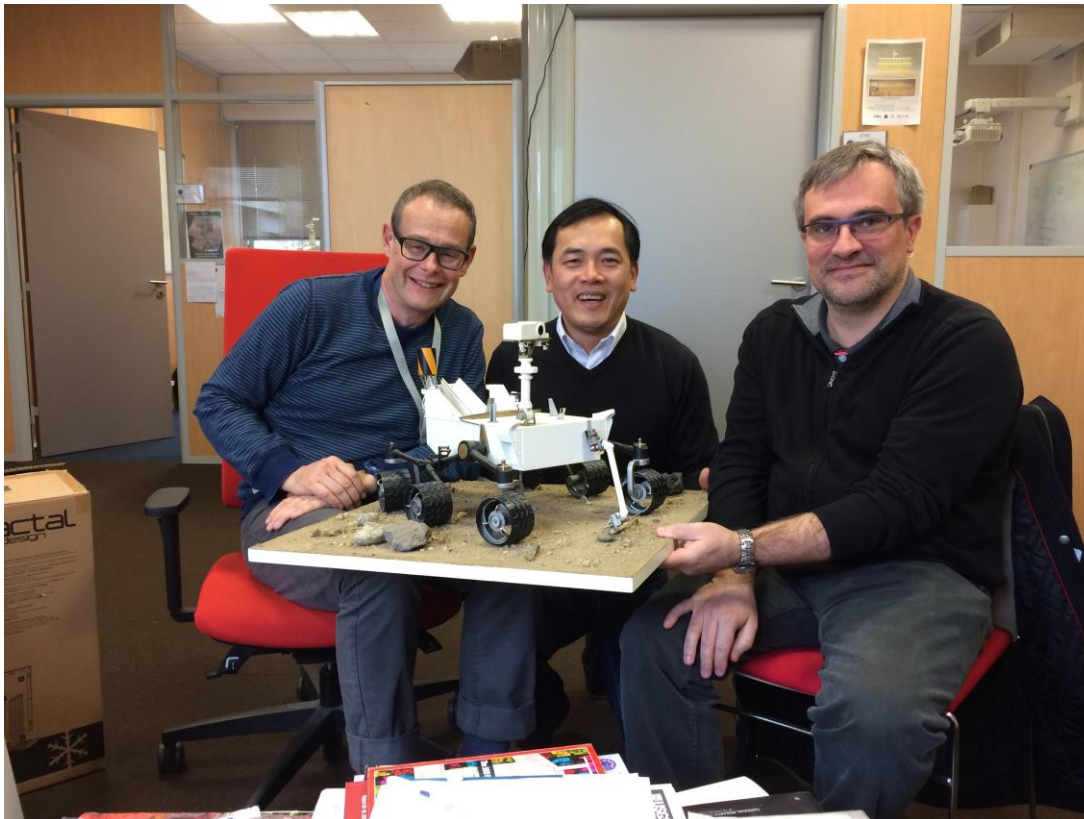
Number of actuations or switch ON/OFF is based on an estimation of 7-time-a-sol on 670 sols, plus tests and calibration on ground, for a total roughly estimated to 10,000.



# SuperCam Project



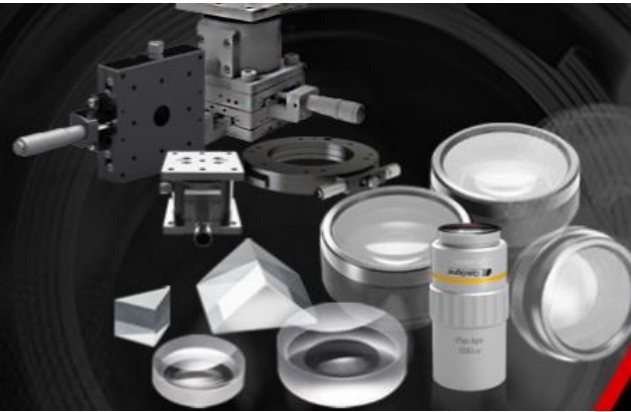
Continue to work with such a requirement and you will survey the Solar System!  
From Dr Sylvestre Maurice / Director IRAP Toulouse



# Come and visit us

At Laser World of Photonics in Munich April 26 - 29  
Hall B4 - 103

Get your free ticket now!



## LASER WORLD OF PHOTONICS 2022



### Come to our booth :

- 26th to 29th April, 2022
- Hall B4 - 103
- Messe München, Munich, Germany

### Please complete the form

Register NOW for a free visitor ticket

First Name \*

Last Name \*

Email \*

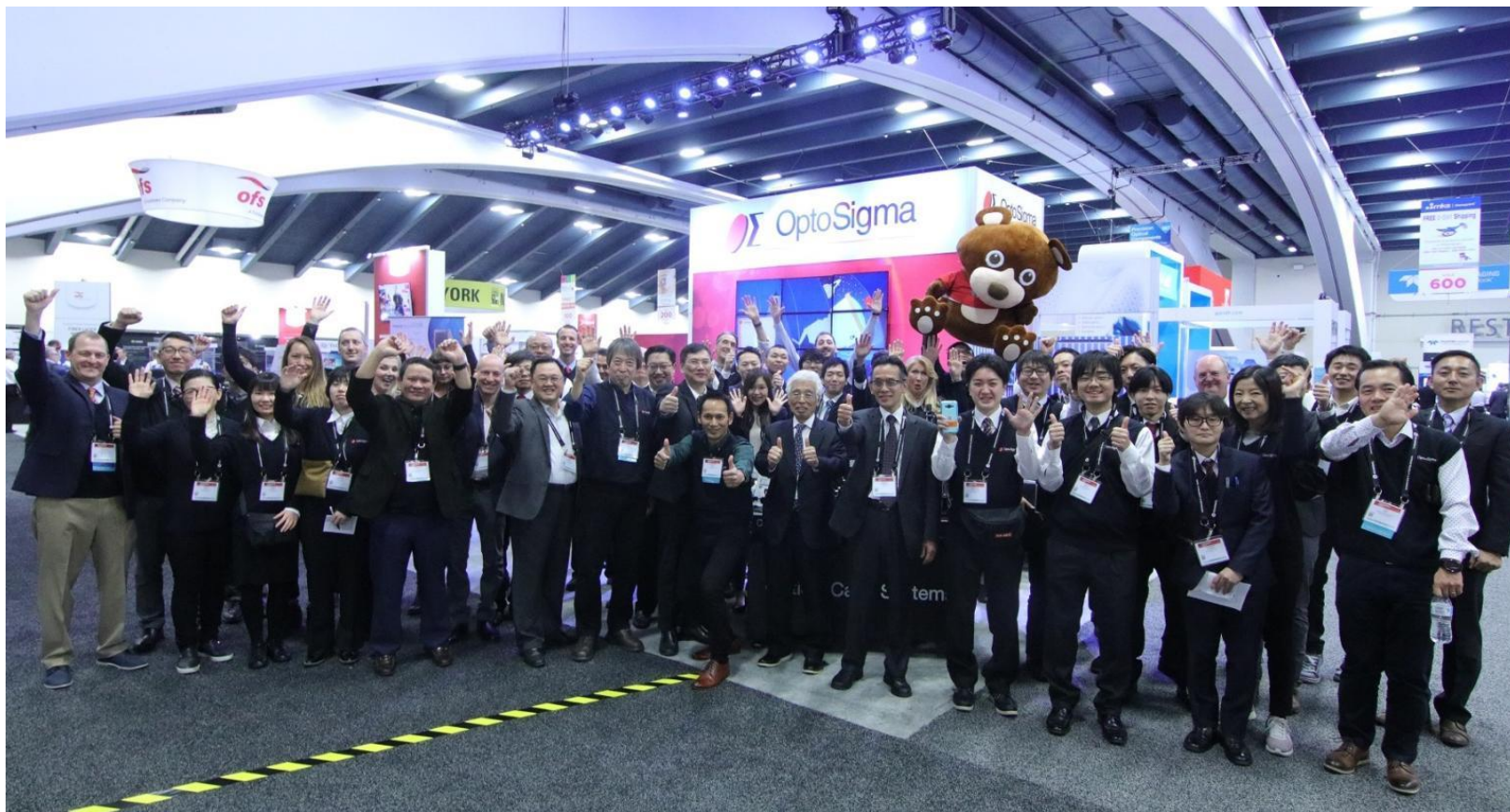
Organization \*

Job title \*

Country \*

REGISTER





# Thank you for your attention !

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