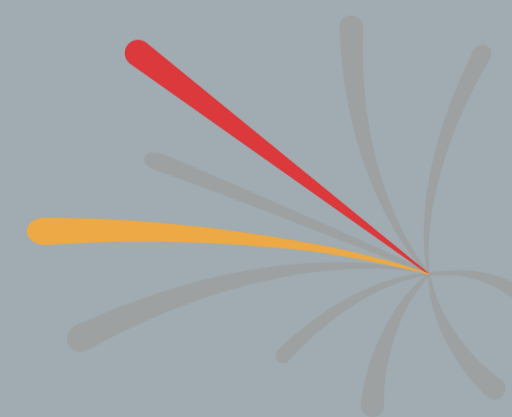




# OPTICAL & PHOTONIC TECHNOLOGIES FOR BIG SCIENTIFIC PROJECTS

## FORO I+D ONES

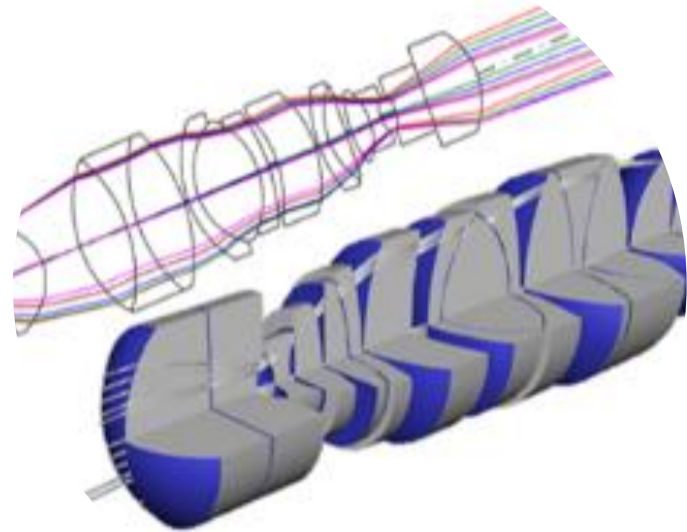


IFMIF  
DONES  
GRANADA

THE KEY  
TO  
THE FUTURE

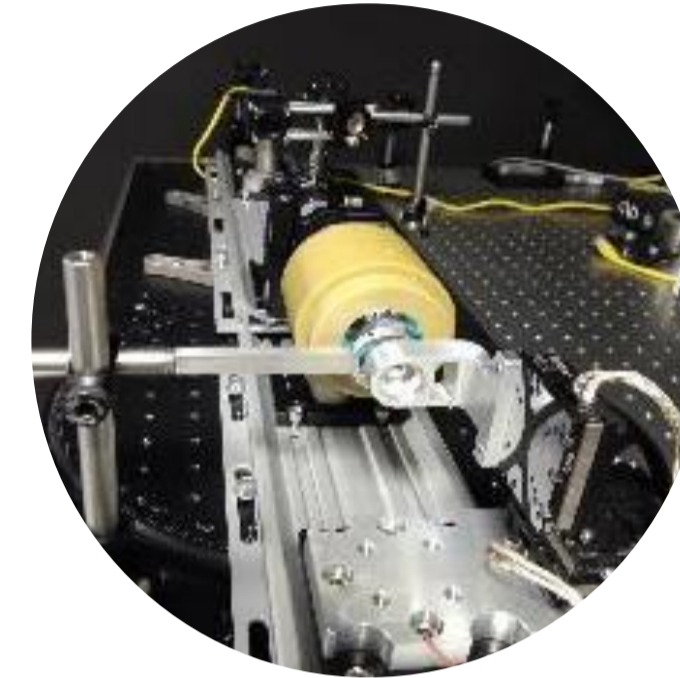
## OPTOMECHANICAL SYSTEMS DESIGN

- Custom lenses and zoom design
- UV, VIS, NIR-SWIR, MWIR & LWIR systems
- Reflective & catadioptric imaging systems
- High N.A microscope objectives



## OPTICAL CHARACTERIZATION

- Automatic bench for EFL & distortion
- OPD, PSF & MTF (UV to LWIR)
- MRC and resolution
- BRDF



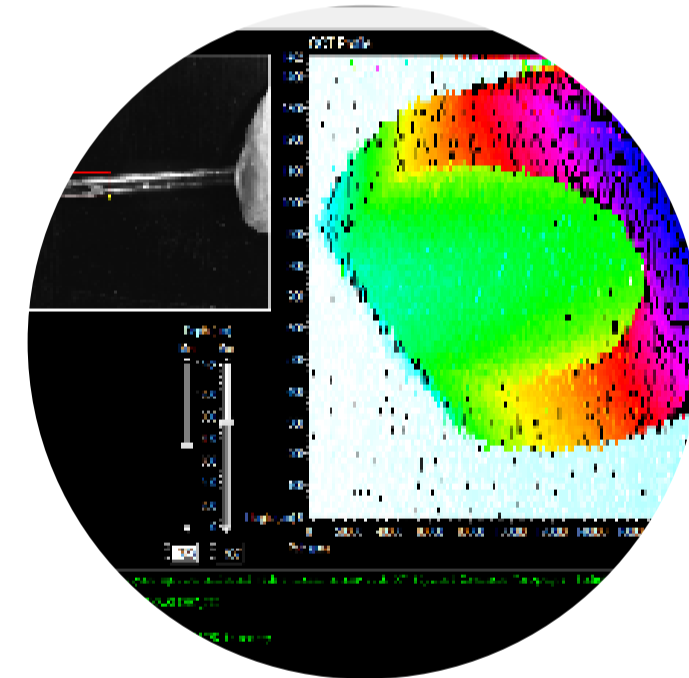
## SYSTEMS INTEGRATION

- Precision optical assemblies
- Laser systems integration
- Ruggedized opto-mechanical systems
- Optoelectronics assembly and integration
- Prototypes, series production



## Algorithms/Software

- Image processing
- Process automated and systems for integrated control
- Analytical measurements



## PRODUCTION

- High-end low volume series production
- Supply-chain management
- Reception, assembly, test and delivery
- After sales technical and admin support



## Research and Development

- Collaborative EU and National funded research
- Private R&D applied to new product development



# COLLABORATION TO THE SCIENTIFIC ADVANCE

PROVIDING SOLUTIONS IN OPTICS AND PHOTONICS TO BIG SCIENTIFIC FACILITIES AND INITIATIVES

# SYNCHROTRON OBJECTIVE LENSES

- Tomography Beam line
  - Radiation protection window, replaceable
  - Focal length: 400mm, 150mm – customizable
  - Distortion: <0.5%
  - Compatible with CCD/CMOS cameras, full-frame
  - Custom mechanical interface



## 400mm OBJECTIVE

Specifications	Range
FOV	160mm
Focal length	400mm ±4mm
Pupil diameter	60mm
Exit pupil position	54.2mm
Distance to object	250mm
Vignetting	0%
Distortion	<0,2%
Objective total mechanical length	191.2mm

## 150mm OBJECTIVE

Specifications	Range
FOV	70mm
Focal length	150mm ±1,5mm
Pupil diameter	50mm
Exit pupil position	10mm
Distance from object to mechanical mount	120mm
Distortion	<0,3%
Transmittance	>80%

- Tomography Beam line
  - Radiation protection window, replaceable
  - Finite conjugate
  - Pupil conjugate solution



## 0.5x RELAY

Specifications	Range
FOV	44mm
NA	0,087
Pupil position	623mm
Pupil position clearance	203mm
Object to objective clearance	420mm
Magnification	0,5 ±1%
Distortion	<0,1%
Transmittance	>86%

## 0.8X RELAY

Specifications	Range
FOV	70,4mm
NA	0,04-0,05
Pupil position	606,4mm
Object entrance pupil diameter	53mm
RF plane	482mm
Magnification	0,83
Distortion	<0,042%
Transmittance	>92%

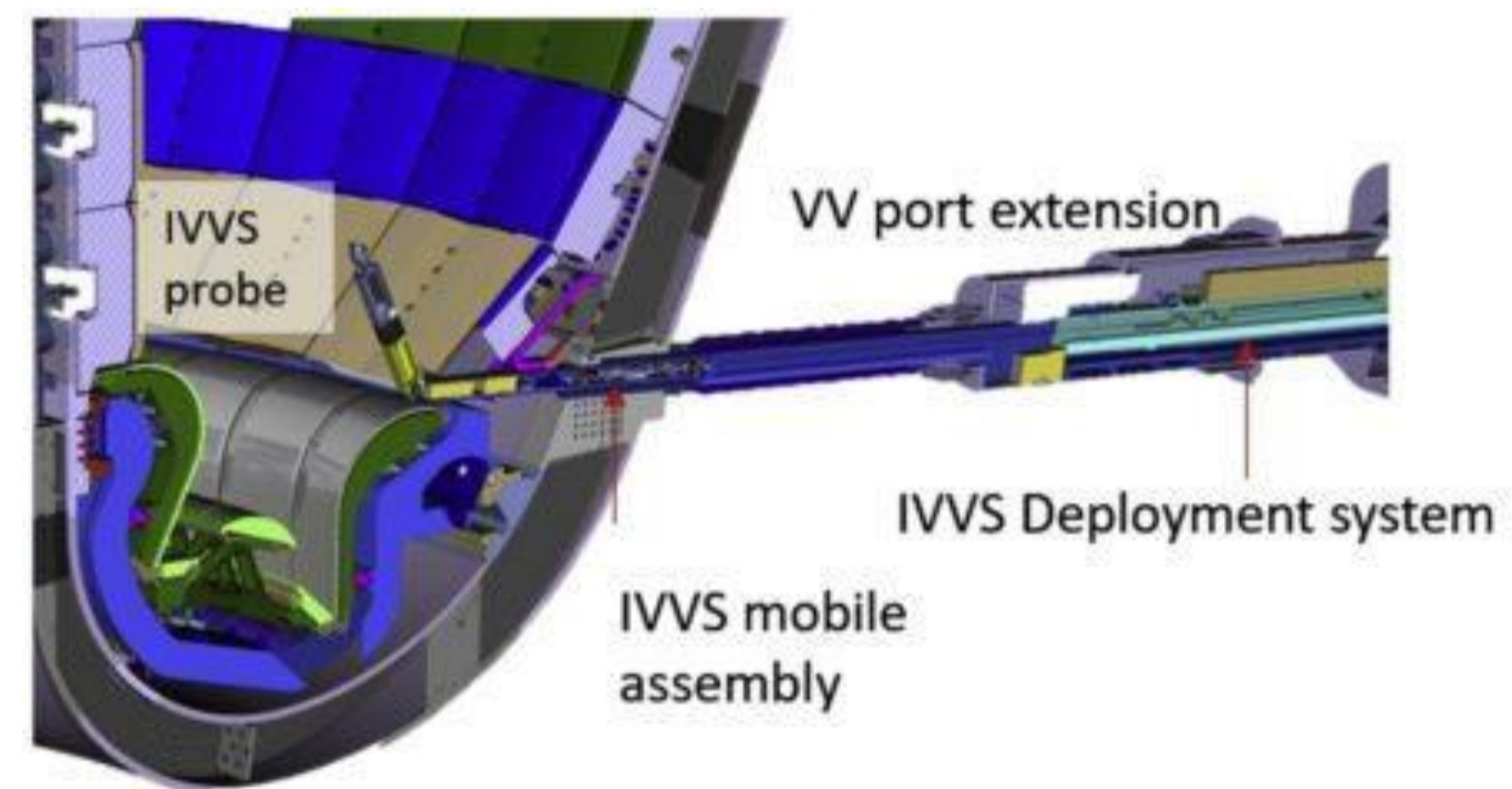
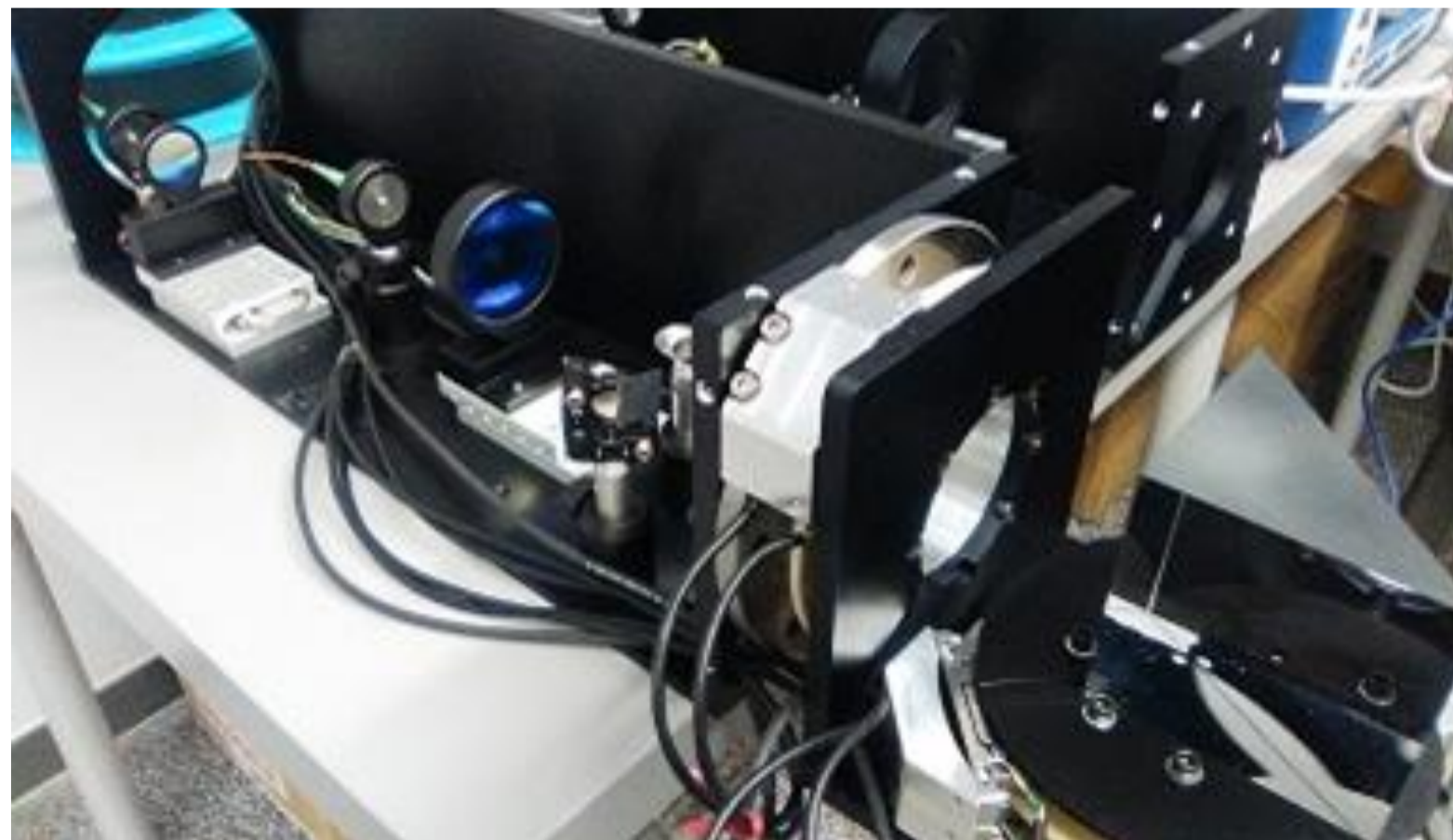
# NUV OPTICAL SYSTEM FOR DETECTION IN HARSH ENVIRONMENTS

- Intensified Digital Cherenkov radiation sensor
  - Optical, optomechanical and electronic design
  - Algorithms for image processing
  - Motorized autofocus
  - Ergonomic studies design
  - Complete system integration and series production



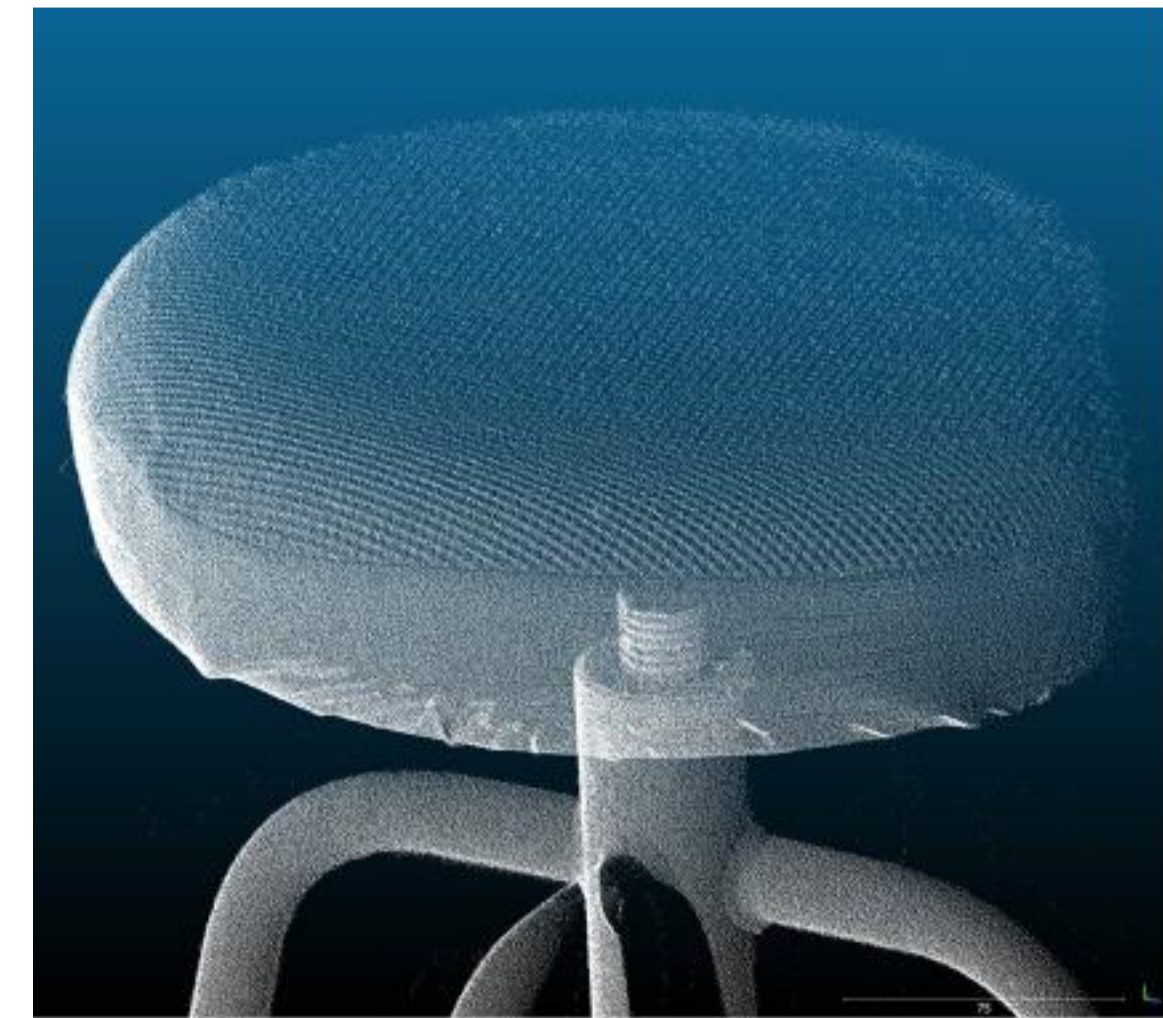
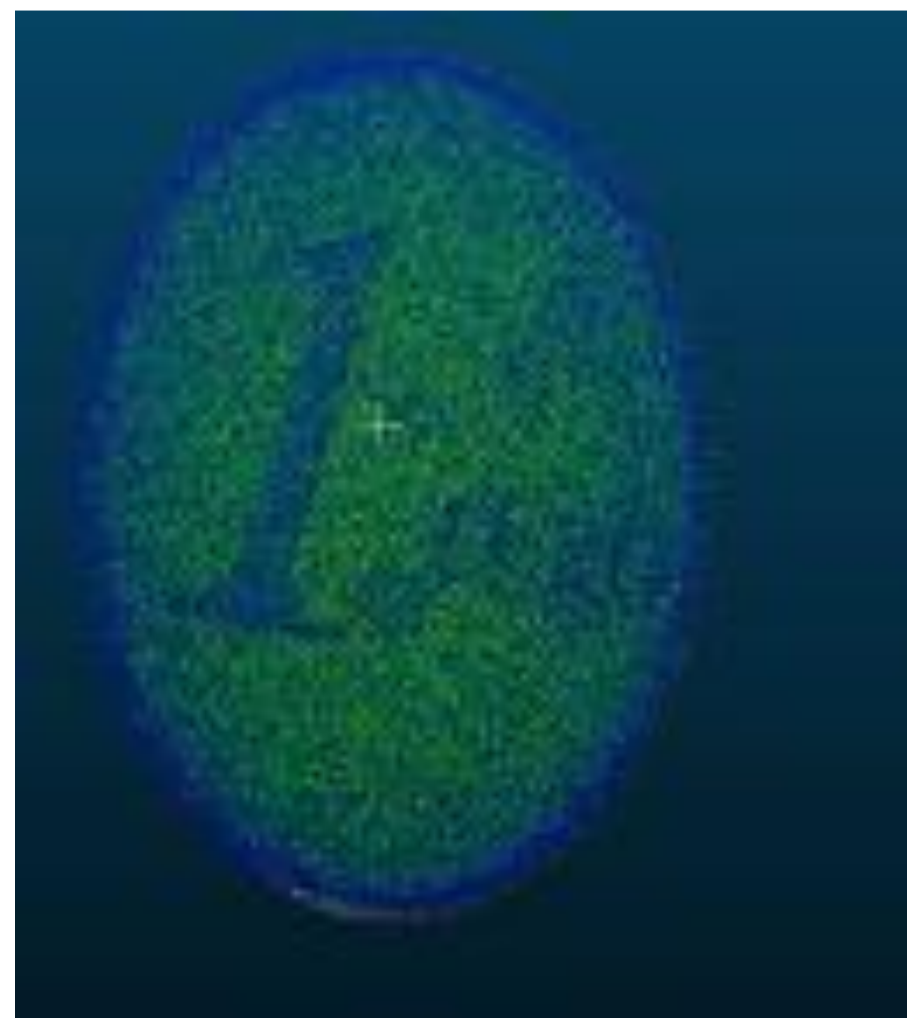
# HIGH PRECISION INSPECTION SYSTEMS (I)

- In-Vessel Viewing and metrology System (IVVS) for the inspection of the ITER tokamak
  - 3D mapping of the vessel tiles to detect any damage or erosion of components during operation.
  - Design and build of the optical prototype system
  - Implementation of the testing process
    - piezo-electric and optical fiber functionality at 200 m cable distance
    - Extensive tests of 3D scanning function



## ○ ITER – DATA PROCESSING AND IMAGE RECONSTRUCTION

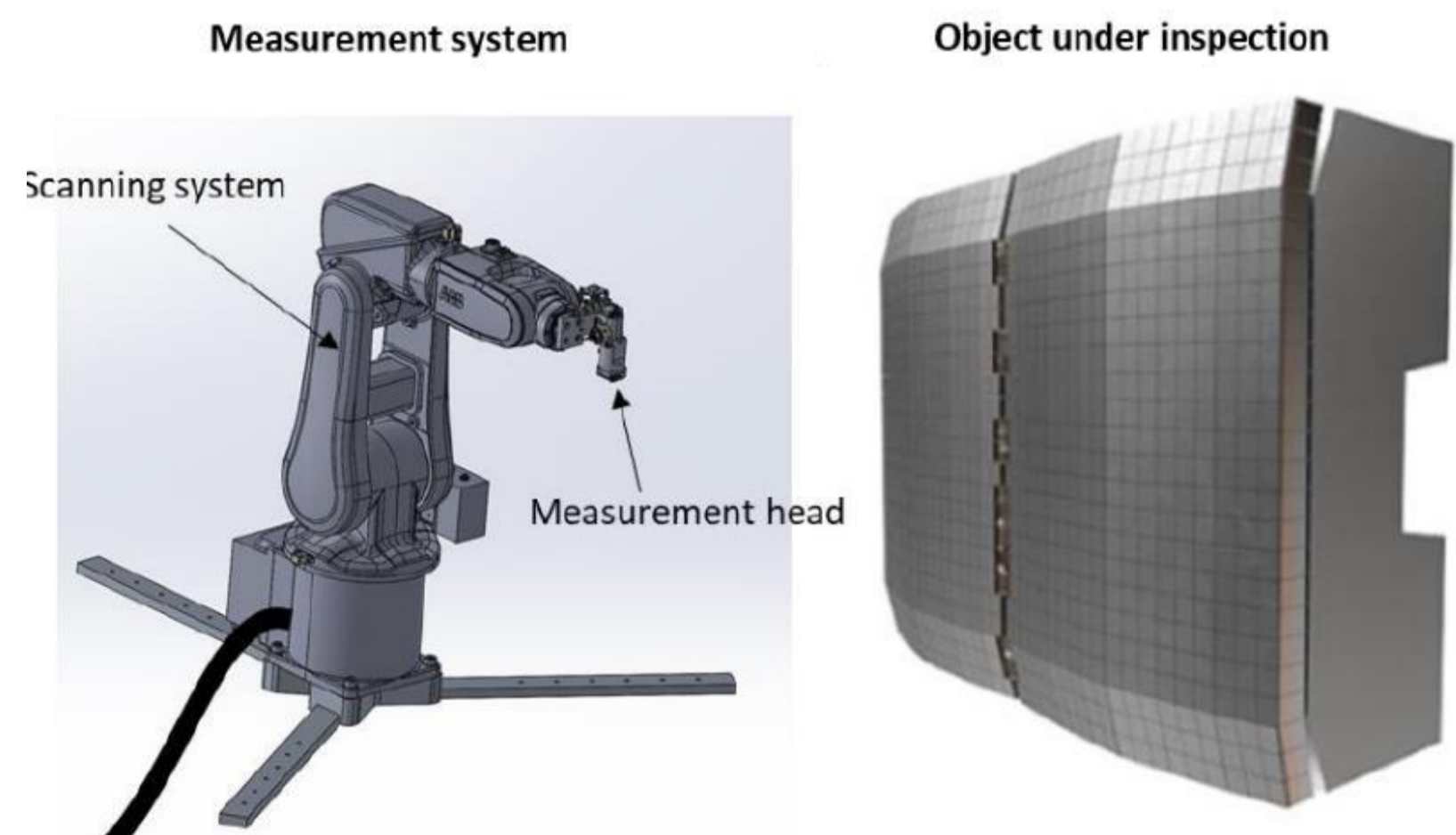
- Raster scan & 3D reconstruction
- Measurement range of 10m
- Depth accuracy down to 0.006mm
- Scanning range sphere 10m radius
- 200 data points per second
- Custom software: data acquisition





## ○ ITER – TARMS

- Target reflectivity measurement system
- Enables the measurement of the back-scattered reflectivity of objects too large or toxic to be used in traditional BRDF measurement instrumentation
- Key performance specifications of current instrument:
  - 100dB dynamic range
  - Incidence angle from normal to  $80^\circ$
  - Reflectivity measurement at 800nm or 1550nm

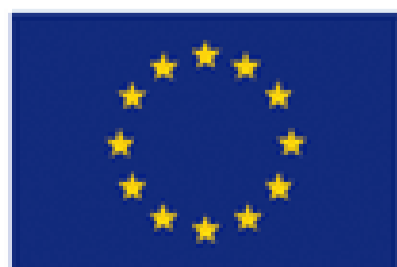


## EFFICIENCY IMPROVEMENT OF FUSION SCIENCE FACILITY

- R&D Project funded by Spanish Government
- intelligent system with the buffering capacity and intelligent demand management will be developed to control the power flow in the grid.
- Optimize the control of the particle beam flow (extraction systems, radio frequency cavities, and Artificial Intelligence strategies).
- The lithium flow will be controlled using non-contact measurement systems that allow real-time monitoring of both flow characteristics and argon levels with intelligent support in unique laboratories designed for this purpose.

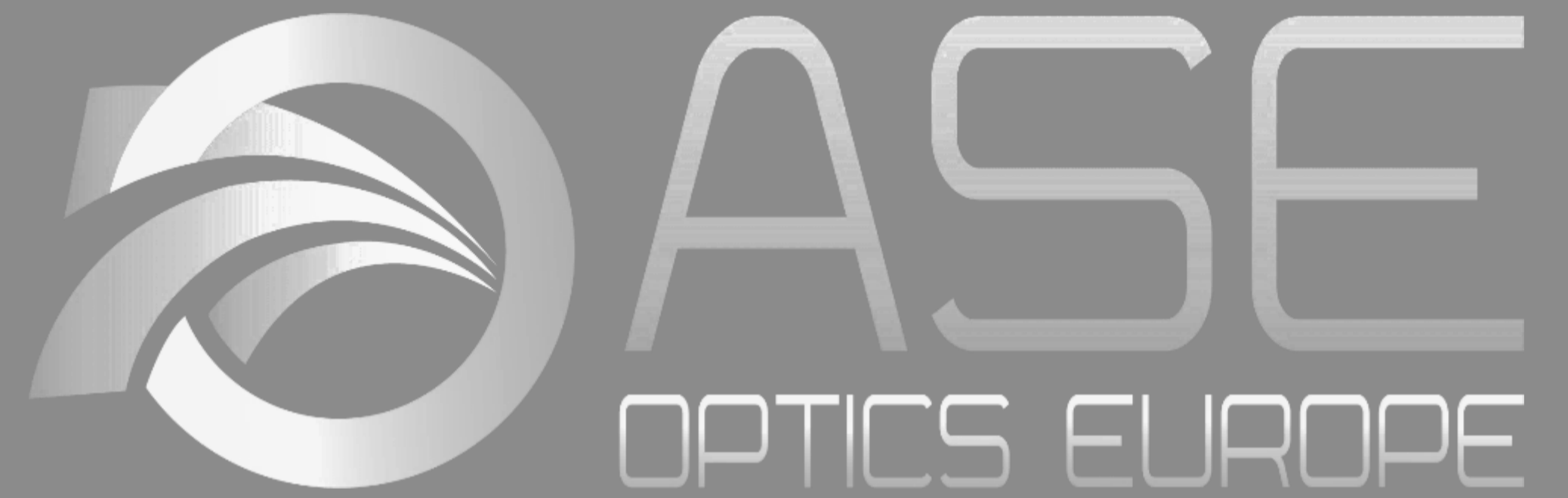


Investigación tecnológica industrial orientada a la optimización de la eficiencia de una Gran Instalación Científica de fusión como es IFMIF-DONES



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