



PORTUGAL IN LARGE-SCALE RESEARCH FACILITIES

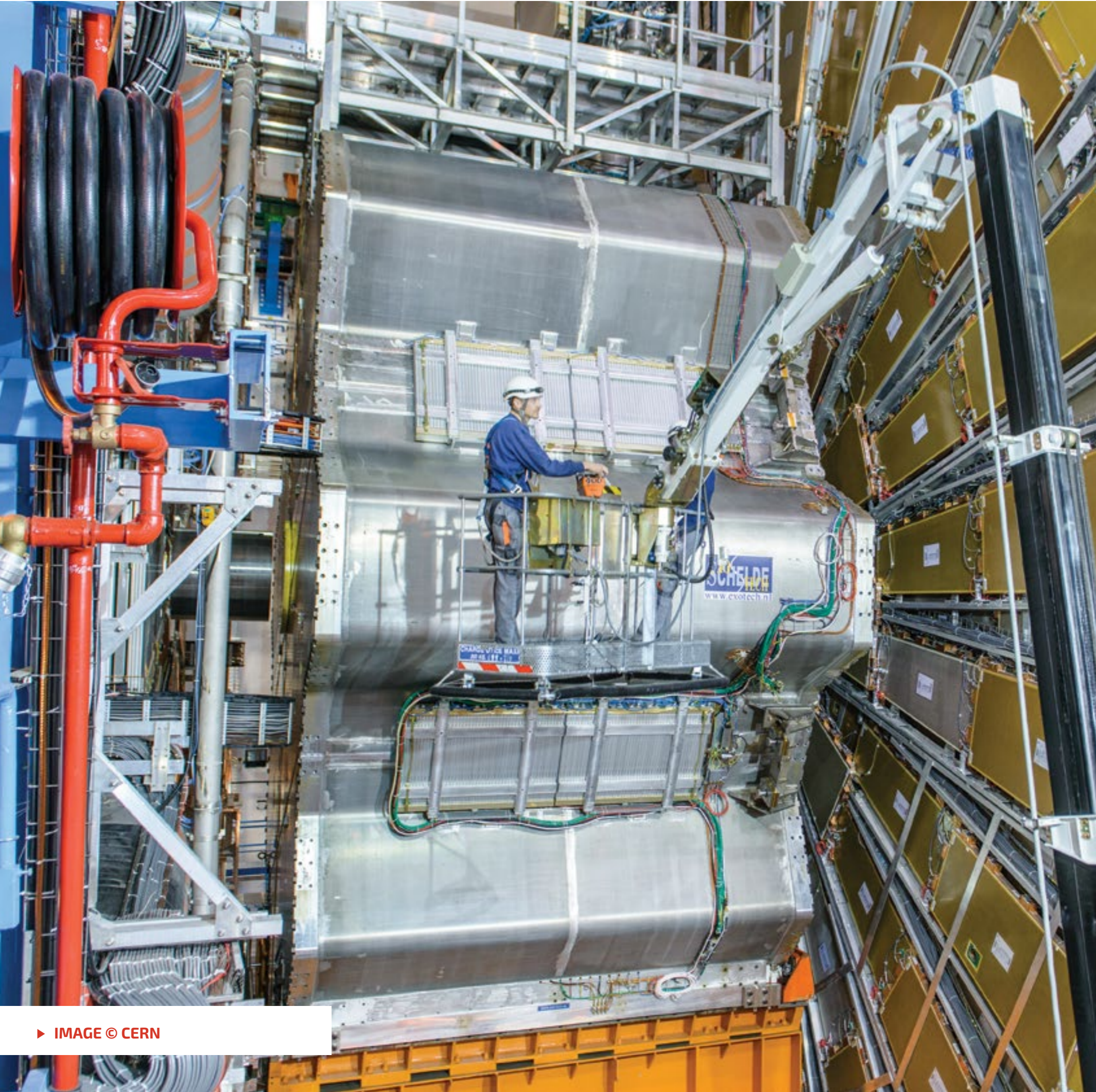
CERN

ESO

ESRF

ITER





PORTUGAL IN LARGE-SCALE RESEARCH FACILITIES

CERN

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FCT

Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Fundação para a Ciência e a Tecnologia (FCT) is the national funding agency for science and research in Portugal. FCT promotes internationally competitive and high impact science, technology and innovation across all areas of knowledge, including exact, natural and health sciences, engineering, social sciences and humanities.

In order to maximise the economic impact of public investment in science, the FCT Technology Office manages programmes facilitating knowledge transfer to industry.

Please reach us through tecnologia@fct.pt and on our website www.fct.pt.

FOREWORD

All truths are easy to understand once they are discovered, the point is to discover them.

Galileo Galilei

Science is driven by human curiosity. Indeed, participation of Portugal in large-scale research facilities confirms the strong commitment of the Portuguese scientific and technological community to explore this curiosity within global research collaborations, and thus produce new knowledge that may lead to discoveries that impact on science and in society.

Portugal's efforts to join large-scale research facilities date back to 1986 with entry to the European Organization for Nuclear Research (CERN). This event is a significant landmark in the internationalisation process of the Portuguese research system. Membership of CERN contributed to membership of other internationally renowned organisations, such as the European Space Agency (ESA) and the European Southern Observatory (ESO), both in 2000, the European Synchrotron Radiation Facility (ESRF) in 1997, the European Union's Joint Undertaking to the International Thermonuclear Experimental Reactor (ITER programme), Fusion for Energy (F4E) in 2007, among other leading scientific organisations.

The Portuguese Government's significant long-term financial investment in these organisations has contributed to boost the international excellence of Portuguese science, to foster advanced qualification of human resources and to stimulate R&D efforts in knowledge and technology transfer, with subsequent impact on national industry.

This catalogue portrays Portugal's current participation in large-scale research facilities. It describes the main competencies of research centres and industry in each field of expertise and the corresponding applications within the research facilities. We hope that this catalogue may provide a view of the rich landscape Portugal offers today, as a reference in international research and contributor to the sustained progress of modern societies.

Miguel Seabra
President of the Fundação para a Ciência e a Tecnologia - FCT

LARGE-SCALE RESEARCH FACILITIES

MESSAGES FROM THE
PORTUGUESE DELEGATES

PROCUREMENT PROCEDURES
FOR EACH FACILITY

CERN

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Portugal's accession to CERN, the European Laboratory for Particle Physics in January 1986, effectively marked a great leap of Portuguese scientific research to its full internationalization.

Following the accession to CERN, Portugal became member of the European Space Agency (ESA), the European Southern Observatory (ESO) and associate member to the European Synchrotron Radiation Facility (ESRF), among other international renowned scientific organizations.

With the participation in these unique scientific infrastructures, in addition to the internationalization dynamic (*now an indispensable science standard*), Portugal secured access to the most advanced experimental equipment and international collaborations necessary to progress as a knowledge nation.

More than half of the Portuguese publications in exact sciences today, result from the work of international collaborations based on large scientific infrastructures. And yet if the main motivation for participation in these infrastructures was and remains of scientific nature, other drivers are associated, such as:

- National industry supply of goods and services that partly offset the financial commitments of the national participation.

- The access to the knowledge and technology transfer opportunities that arise from fundamental research. As an example, from CERN know-how and technologies, Portuguese industry managed to further develop and differentiate some products and services in: i) electron beam welding, ii) vacuum systems, iii) microelectronics assembly, iv) medical imaging technologies.

- Advanced training for young engineers supported by a national programme linking knowledge from fundamental research to the national industry. During the last 15 years more than 250 engineers participated in this programme up to two years at CERN, ESA and ESO.

- Increased opportunity vs expertise elements for scientific and technical jobs at CERN, among national scientists and engineers, which today represent a significant higher percentage comparing to the overall contribution of Portugal to CERN.

- The last thirty years in Portugal have been of vigorous growth of many national scientific communities at these international organizations as well the successes of our national industry taking some large contracts, resulting in a label of excellence for Portugal science, technology and innovation.

Gaspar Barreira
National Delegate to the CERN Council

ESO

EUROPEAN SOUTHERN OBSERVATORY

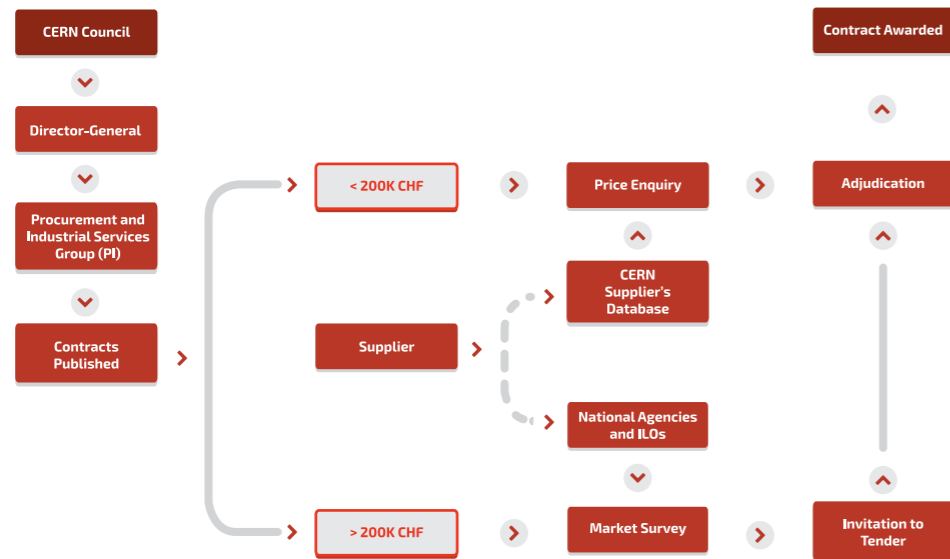
Modern astronomy and astrophysics is in a golden era of discoveries and yet facing very fundamental, still unanswered, questions. Progress is intimately connected with new facilities and infrastructures, which give access to previously unseen phenomena and firmly test extrapolations from our current knowledge. The scale and cost of these facilities has long ago surpassed those of individual states, which now gather in enabling organizations. The European Southern Observatory (ESO) is an intergovernmental organization building and operating the most advanced telescopes of the world. It is therefore critical for the scientific competitiveness of its member states and in particular of Portugal.

But there is much more to Portugal from ESO than the scientific discoveries of Portuguese teams, their international integration, the consequent impact of their productivity in the rankings of Portuguese Universities and the Portuguese state, or to the fundamental importance of its scientific outreach in creating an attitude of love for science in children and adults alike.

A fundamental asset of ESO for Portugal is that its people and organizations participate in a network operating at the leading edge. This unique environment, rich in opportunities, is very demanding. The organizations in this portfolio are very competitive, innovative, have quality at the core and superb human capital. ESO is making this happen. By integrating these organizations in international networks that share the same spirit and attitude, ESO propels Portuguese organizations to the forefront.

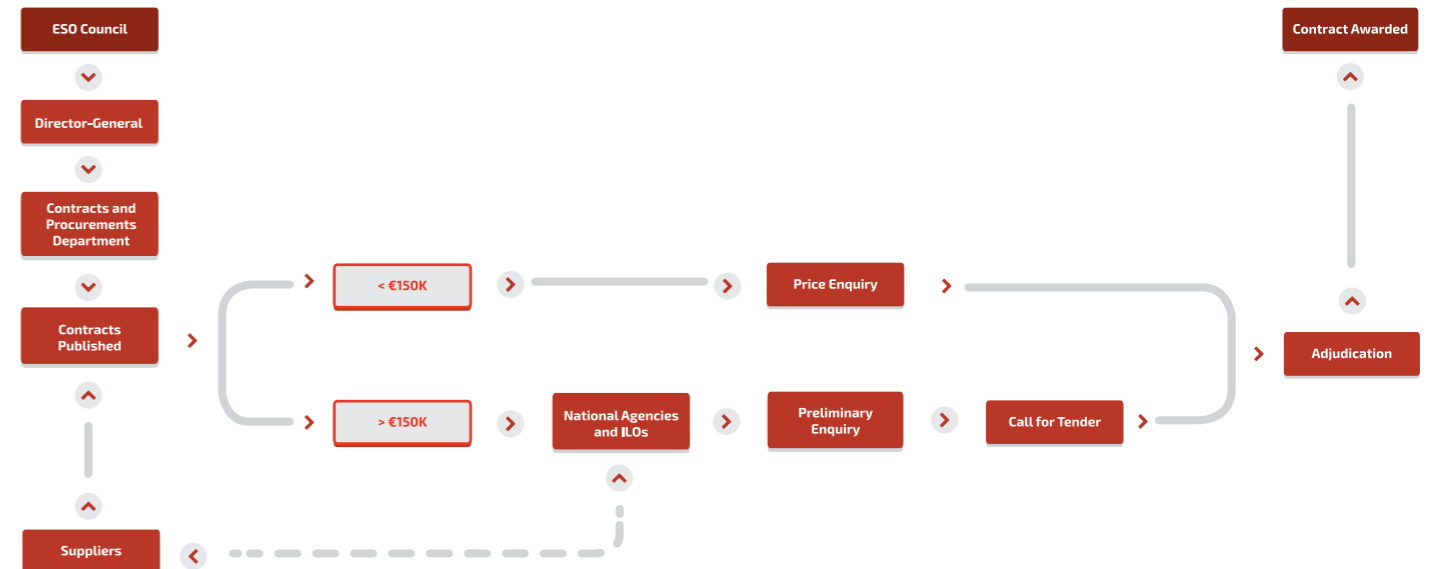
Paulo Garcia
National Delegate to the ESO Council

PROCUREMENT PROCESS



NOTE: For more information on the procurement process by CERN, consult: <http://procurement.web.cern.ch/>

PROCUREMENT PROCESS



NOTE: For more information on the procurement process by ESO, consult: <http://www.eso.org/public/industry/cp.html>

ESRF

EUROPEAN SYNCHROTRON RADIATION FACILITY

Portugal is a Scientific Associate Member of the ESRF since December 1998 and in 2013 this membership was renewed for another 5 years.

Portuguese researchers have been users in fields as diverse as Structural Biology, Life Sciences, Chemistry, Physics, Materials Science, Chemistry and Cultural Heritage. With a participation share of 1%, the Portuguese community of around 100 users has been actively involved in experiments at the ESRF, with an excellent outcome and a steady increase in the number and impact of publications.

The national community of ESRF users has grown over the years and is expected to increase even more in the coming years due to the developments and new opportunities that will be enabled by Upgrade Phases I and II of its scientific infrastructure.

Upgrade Phase I (2009-2015), under implementation, includes the development of new key technologies at the ESRF, namely: Inelastic X-ray Scattering, NINA-Nano-Imaging and Nano-Analysis, Soft-X-rays, Nano-magnetism and Spectroscopy.

Upgrade Phase II (2015-2020), under preparation, will enable a tremendous gain in brilliance, flux and coherence. The identified science drivers of the Upgrade programme are: Science at Extreme Conditions; Nano-science and Nano-technology; X-ray Imaging; Structural & Functional Biology; Time-resolved Science and Soft Condensed Matter.

Since 2012, annual meetings of Portuguese synchrotron radiation combined with an ESRF-day have maintained the national community informed about the ever-increasing opportunities offered by the ESRF Research Institute.

Beyond the scientific benefit and advanced training, Portugal has the possibility of participating in calls for tenders, contributing to increase the competitiveness and technological innovation of the national industry.

Maria João Romão
National Delegate to the ESRF Council

ITER

INTERNATIONAL THERMONUCLEAR EXPERIMENTAL REACTOR

Research into fusion power research and development, and in particular the participation into ITER construction, presents industry with many business opportunities. In addition to winning contracts for products and services, the technical and quality demands of fusion projects can create long-term competitive advantages for the Portuguese companies.

In the coming years important progresses will be made on the development of diagnostics and auxiliary systems. SMEs may have an important role in supporting its construction in areas such as mechanical and electrical engineering, design consultancy and project management, through to instrumentation, advanced materials, magnets, vacuum systems, nuclear technologies and precision engineering.

The opportunity created from the participation in ITER project can far extend the immediate business. The participation of European companies in Fusion, fostered innovative developments and has already enabled several spin-off technologies from fusion in areas as diverse as space research, advanced braking systems and semi-conductor manufacture.

In the medium-term it is expected that companies working in close collaboration with the research programme can contribute to the industrialization of fusion technology and contribute to the design and specification of a first of a kind fusion power plant.

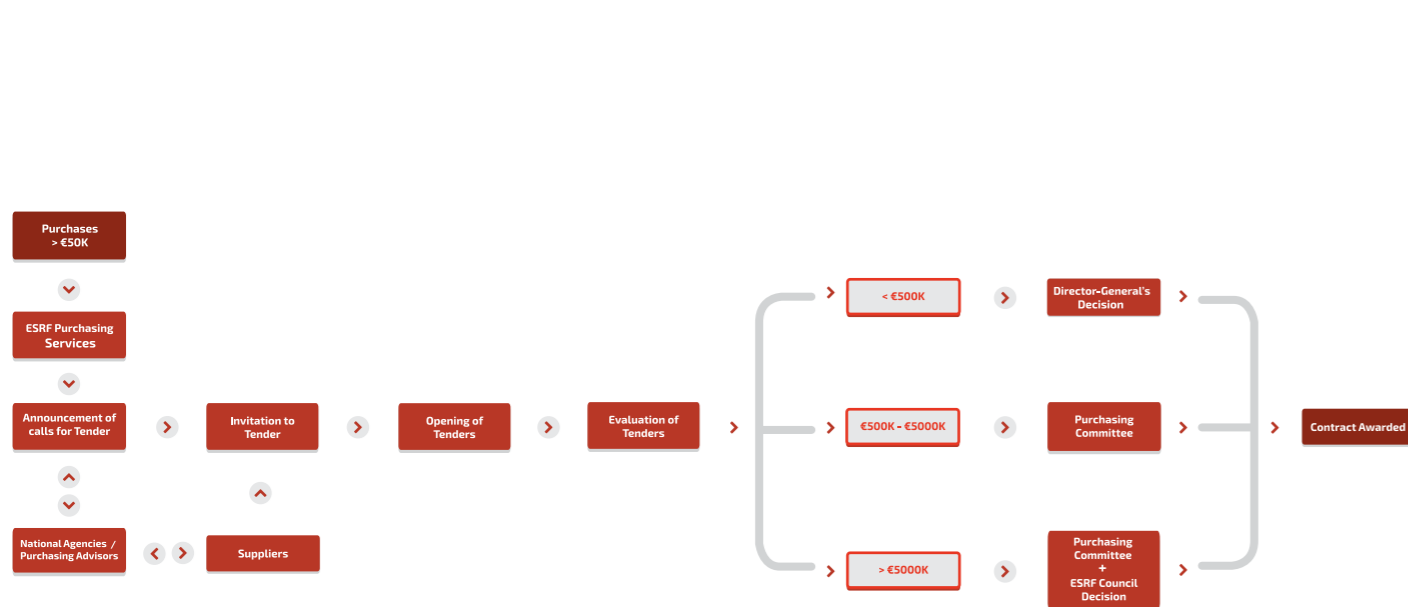
Nationally a strong effort has been made to promote the opportunities for fusion to the Portuguese scientific and technological community.

The success is moderate but a few companies and R&D institutions have answered positively and with success to several ITER bids.

Overall, fusion activities can foster innovation and economical growth and efforts have been made to enhance the Portuguese contribution.

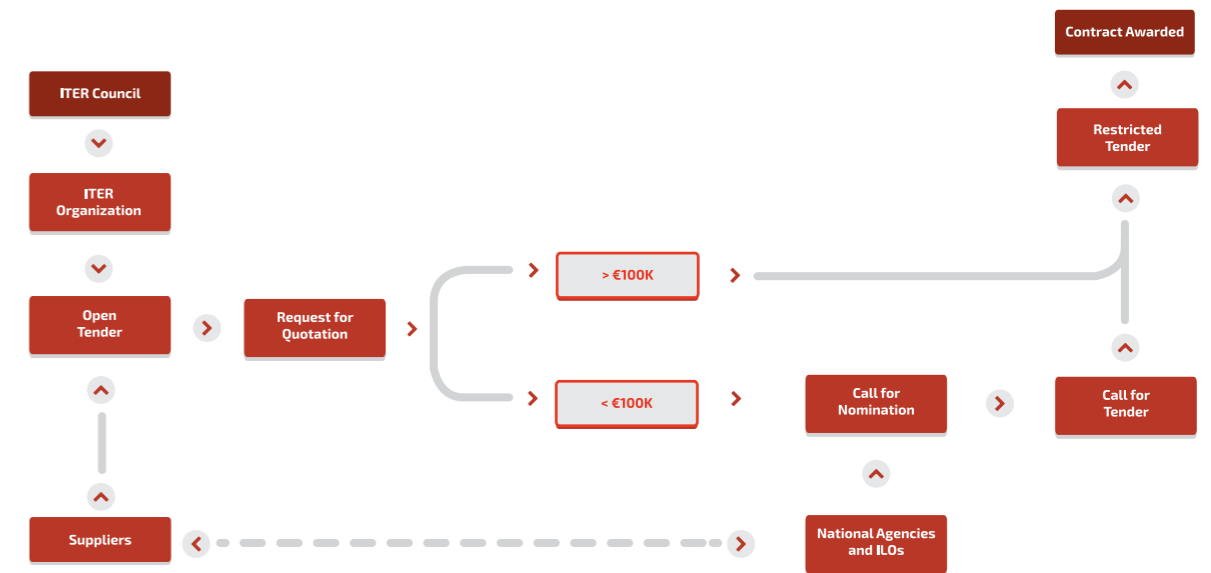
Pedro Carneiro
Member of the Governing Board, Fusion for Energy
(European Union's Joint Undertaking for ITER)

PROCUREMENT PROCESS



NOTE: For more information on the procurement process by ESRF, consult: Purchasing Service - georgoux@esrf.fr

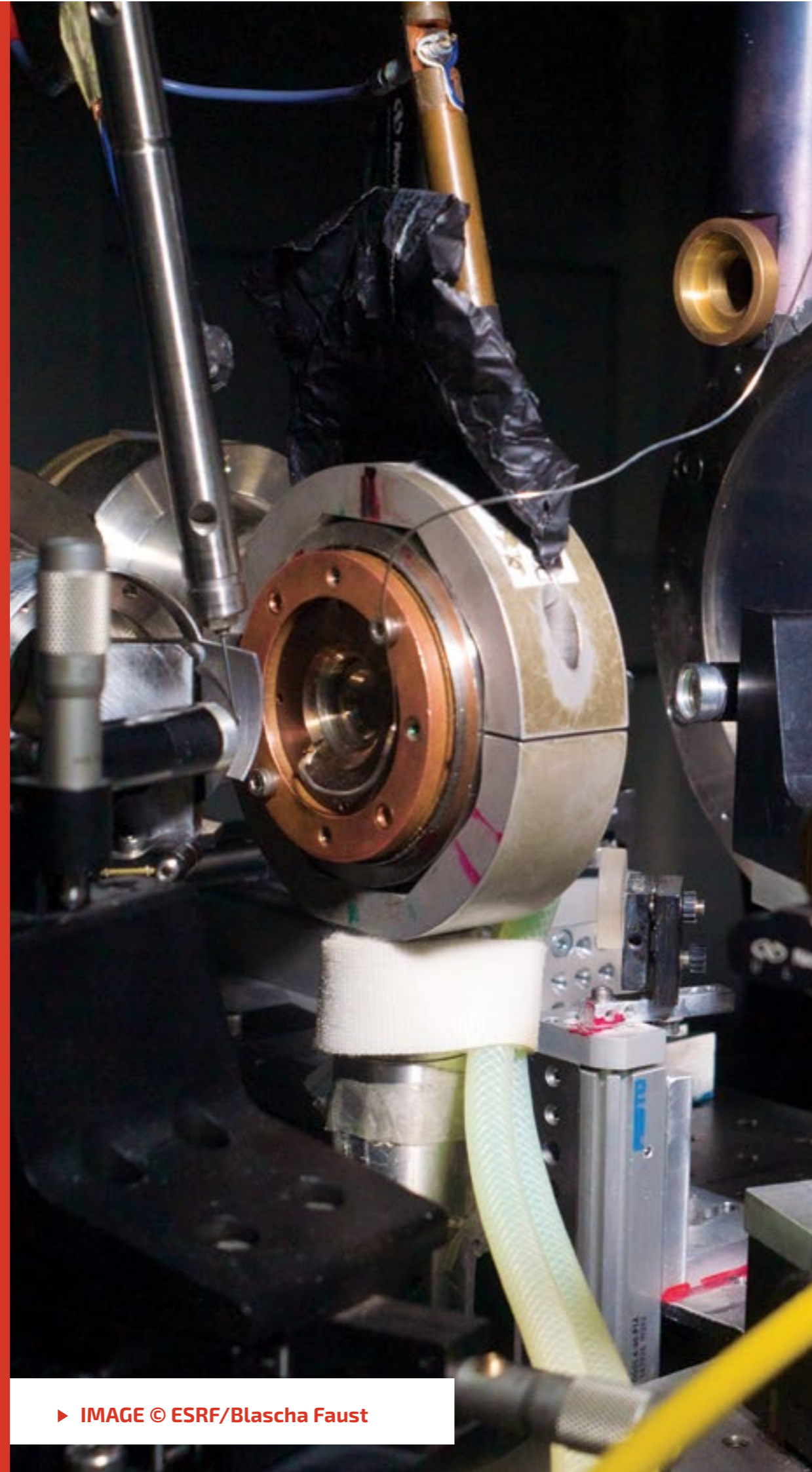
PROCUREMENT PROCESS



NOTE: At European Level the European Domestic Agency - Fusion for Energy (F4E) is responsible for the procurement for ITER.

For more information consult: https://industryportal.f4e.europa.eu/IP_PAGES/ehome.aspx

COMPANIES



► IMAGE © ESRF/Blascha Faust

ORGANIZATIONS SUPPLIED BY THE COMPANY

CERN

- ▼ A. Silva Matos
- ▼ Active Space
- ▼ Cudell
- ▼ Cunhol
- ▼ Efacec
- ▼ Glintt
- ▼ Incomef
- ▼ ISQ
- ▼ NCP Metal
- ▼ Siroco
- ▼ Solidal

ESO

- ▼ A Silva Matos
- ▼ Active Space
- ▼ Critical Software
- ▼ Exatronic
- ▼ ISQ
- ▼ Solidal

ESRF

- ▼ Efacec
- ▼ Glintt

ITER

- ▼ A Silva Matos
- ▼ Active Space
- ▼ Fiber Sensing
- ▼ ISQ

TECHNOLOGY DOMAIN

SOFTWARE

- ▼ Critical Software
- ▼ Cudell
- ▼ Efacec
- ▼ Exatronic
- ▼ Fiber Sensing
- ▼ Glintt
- ▼ Incomef

HARDWARE

- ▼ A. Silva Matos
- ▼ Active Space
- ▼ Cudell
- ▼ Cunhol
- ▼ Efacec
- ▼ Exatronic
- ▼ Fiber Sensing
- ▼ Glintt
- ▼ Incomef
- ▼ ISQ
- ▼ NCP Metal
- ▼ Siroco
- ▼ Solidal



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ORGANIZATIONS SUPPLIED BY THE COMPANY

- ▶ CERN
- ▶ ESO
ESRF
- ▶ ITER

TECHNOLOGY DOMAIN

- SOFTWARE
- ▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Storage Tanks
- ▼ LPG Storage Tanks
- ▼ Gaseous Helium Storage Tanks

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

With more than 30 years of experience, A. Silva Matos Metalomecânica quality is worldwide recognized in the Oil & Gas business.

Its activity is based on the manufacturing of pressure vessels and welded equipment for Oil Companies, Refineries, Chemical and Petrochemical Industries.

The company is one of the world's most renowned manufacturer of storage tanks, namely, LPG storage tanks, cryogenic tanks, ADR drums for refrigerants and all type of vessels and welded constructions for different applications.

ANNUAL TURNOVER

€11 million

FIELDS OF EXPERTISE

CERN, ESO, ITER
- Storage tanks

MAIN PRODUCTS AND SERVICES

CERN

Engineering and manufacturing of 46 horizontal tanks with a capacity of 250m³, for the storage of gaseous Helium.

All 46 tanks were delivered to the CERN headquarters in Switzerland.

ESO

Engineering and manufacturing of 3 horizontal tanks with a capacity of 206m³, for the storage of LPG.

All 3 tanks were delivered in the Atacama Desert, for the ALMA Project.

ITER

Engineering and manufacturing of 6 horizontal tanks with a capacity of 250m³, for the storage of gaseous Helium.

All 6 tanks will be delivered in Japan, for the JT-60 SA project.





ACTIVE SPACE TECHNOLOGIES

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ORGANIZATIONS SUPPLIED BY THE COMPANY

CERN

▶ ESO

ESRF

▶ ITER

TECHNOLOGY DOMAIN

SOFTWARE

▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▶ Automation & Robotics components and Technologies
- ▶ Control electronics technologies
- ▶ Structural design and verification methods and tools

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

Active Space Technologies offers bespoke electro-mechanical systems for extreme harsh environments, such as instruments and mechanisms, actuators and wireless sensing systems. Our systems are qualified for high-g, high temperature radiation environments.

Our core activities focus on:

- space instrumentation,
- structural and thermal control systems for space applications,
- harsh environment monitoring and control systems for aerospace applications,
- remote handling systems for hazardous and radiation environments,
- automated systems for industry.

ANNUAL TURNOVER

€1.4 million

FIELDS OF EXPERTISE

Active Space Technologies offers added-value Engineering services in the fields of: Mechanical engineering (thermal, fluids, and structural analysis, design, precision CNC); Electronics engineering (automation & control, embedded systems, digital control).

- Thermal and Fluids Engineering
- Structural Engineering
- Mechanical & CAD Design
- Prototyping & Manufacturing
- Automation & Control
- Digital Control
- Embedded Systems
- Product Development



MAIN PRODUCTS AND SERVICES

PROJECTS

Adaptive Optics Calibration Unit - E-ELT (European Southern Observatory)

Active Space Technologies developed the Adaptive Optics Calibration Unit (AOCU) conceptual design for ESO's E-ELT, including the optics, opto-mechanical design, structural and thermal analysis, automation, integration, service and test equipment which are necessary for optical alignment, maintenance and testing of the AOCU.

Core Thompson Scattering System - ITER (ITER Organization)

Active Space Technologies designed a number of remote handling equipment and opto-mechanical diagnostics for JET and ITER: Mascot Winch, DTP2, Port Plug Front DSM, and VIS/IR optical hinge.

Furthermore, Active Space Technologies has been involved in the mechanical and thermo-elastic design of the optics and structure of Core Thompson Scattering System.





CRITICAL SOFTWARE

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ORGANIZATIONS SUPPLIED BY THE COMPANY

- CERN
- ▶ ESO
- ESRF
- ITER

TECHNOLOGY DOMAIN

- ▶ SOFTWARE
- HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Verification and Validation
- ▼ High-Integrity Software Development
- ▼ Model Based/Control Engineering
- ▼ Real-time performance management

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

Working in the aerospace & defence industry, Critical Software has established itself as a reliable, proactive and cost-effective partner for customers seeking innovative solutions to their most demanding challenges. In-depth knowledge and experience in safety critical embedded systems (DO-254/DO-178B Level A), Integrated Logistics Support systems, Independent Software Verification & Validation, Navigation Avionics Certification Support and Deploying, and Reliability, Availability, Maintainability and Safety (RAMS).

ANNUAL TURNOVER

€22.2 million

FIELDS OF EXPERTISE

Safety-Critical Software Development, Embedded and real-time systems (DO-178B, EN-50128, ISO 26262, GSWS, ECSS);

Safety-Critical Validation (Verification and Validation, RAMS, Certification Support, Fault Injection);

Model Based/Control Engineering;

Real-time performance management;

Machine-to-machine interfaces;

Data extraction, handling and processing;

Engineering data analysis.



MAIN PRODUCTS AND SERVICES

Safety-Critical Software Development, Embedded and real-time systems

Expertise in the development of high-integrity real-time embedded software. This expertise targets markets such as avionics, space, defence, railways and automotive, holding a body of knowledge in business specific standards (DO-178B, EN-50128, ISO 26262 and ECSS).

Safety-Critical Validation

Provide professional engineering dependability, safety and independent verification and validation services in the field of high integrity systems. Diversified experience in safety/mission-critical systems for different industrial domains.

Model Based/Control Engineering

Services for model based development of systems, including control engineering and model testing activities to reduce the development time and increase system confidence.

Real-time performance

Knowledge in real-time performance monitoring/management including control engineering to integrate all actions in the same platform for a specific plan or set of plans.

Machine-to-machine interfaces

Integrate several systems in order to produce a system of systems that is able to work efficiently and provide the necessary exchange between different machines.

Data extraction, handling, processing

Data analysis of large volumes of data, scattered across multiple sources and transforming this data into valuable information.

Engineering data analysis

Able to process large amount of data and provide structured results to understand/support business decisions.





CUDELL
- ENGENHARIA & SERVIÇOS, LDA.

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**ORGANIZATIONS SUPPLIED
BY THE COMPANY**

▶ **CERN**

ESO
ESRF
ITER

TECHNOLOGY DOMAIN

- ▶ SOFTWARE
- ▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Oil hydraulic systems
- ▼ After sales services in the oil-hydraulics domain

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

Cudell - Engineering & Services activity is providing of services, engineering and commercialization of components in oil-hydraulic and industrial automation domains.

With about 30 employees in Porto and Palmela, with skills in the areas of oil-hydraulics, mechanics and automation, we ensure the most appropriate response to your needs.

Cudell - Engineering & Services is an important partner in the most varied types of industry and services by developing solutions and providing technical services in the area of oil-hydraulics, mechanics and automation.

ANNUAL TURNOVER

€4.3 million

FIELDS OF EXPERTISE

Design and production of oil-hydraulic systems.

After sales services in the oil-hydraulics domain.

MAIN PRODUCTS AND SERVICES

Project, engineering, production, installation and commissioning of oil-hydraulic and automation systems.

Providing of repair services, technical assistance abroad, assemblies, preventative maintenance at clients and training in oil-hydraulics.

Commercialization and technical specification of oil-hydraulic components of the main world manufacturers.





CUNHOL
- INDÚSTRIA MECÂNICA DE
PRECISÃO, LDA.

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**ORGANIZATIONS SUPPLIED
BY THE COMPANY**

► CERN

ESO
ESRF
ITER

TECHNOLOGY DOMAIN

SOFTWARE

► HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Power Supplies
- ▼ Mechanical Precision Industry
- ▼ Tools and Mechanical Parts
- ▼ Development and Manufacturing

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

CUNHOL Lda. was established in 1971, dedicated to precision mechanic, small parts manufacture in several sectors like Aeronautic and Food, repairing and new spare parts to industrial Maintenance.

One of our main strength is being a company that has its own facilities, with a useful area of 3500 square meters. Where we have the Administration Office and their Departments:

- Production Machines, Pressing Area, Storage Area, Assembly Area, CAD/CAM Engineering Department, Quality Control Department and an Area of loading and unloading for heavy vehicles

CUNHOL Lda. is a Portuguese Company with certification ISO 9001: 2008 and ISO TS 16949.

ANNUAL TURNOVER

€2.8 million

FIELDS OF EXPERTISE

With the growing of the company and our good work, we decided to start doing design, development and manufacture of small projects of Tools and Dies for the Automotive Industry. Years later it would became one of our main activities.

Our visit card, putting CUNHOL Lda. as one of the most competitive and specialized of our country.

We are engaged in the:

- Design, Development and Manufacture of Molds, Dies, Cutting and Progressive Tools;
- Serial production of sheet metal parts;
- Manufacture of high precision parts;
- Machining of large mechanical structures and metalwork general mechanics.

Since the beginning CUNHOL Lda. have been growing, always looking for diverse their position in the market, being today a company with credits in Industrial Maintenance, Aeronautic high precision parts manufacture, Design, Development and Manufacture of cutting and stamping tools for sheet metal parts and sheet metal parts production.



MAIN PRODUCTS AND SERVICES

We have at our disposal a wide range of tooling machines capable of large scale machining, grinders, lathes, high speed machining centers for part production and a section of EDM for maximum precision parts.

There is also a pressing area with capacity for tools up to 3 Meters and 400 Tons of Pressure, and faster and lighter presses for large productions, that give us In-House try-out capability and sheet metal part productions.

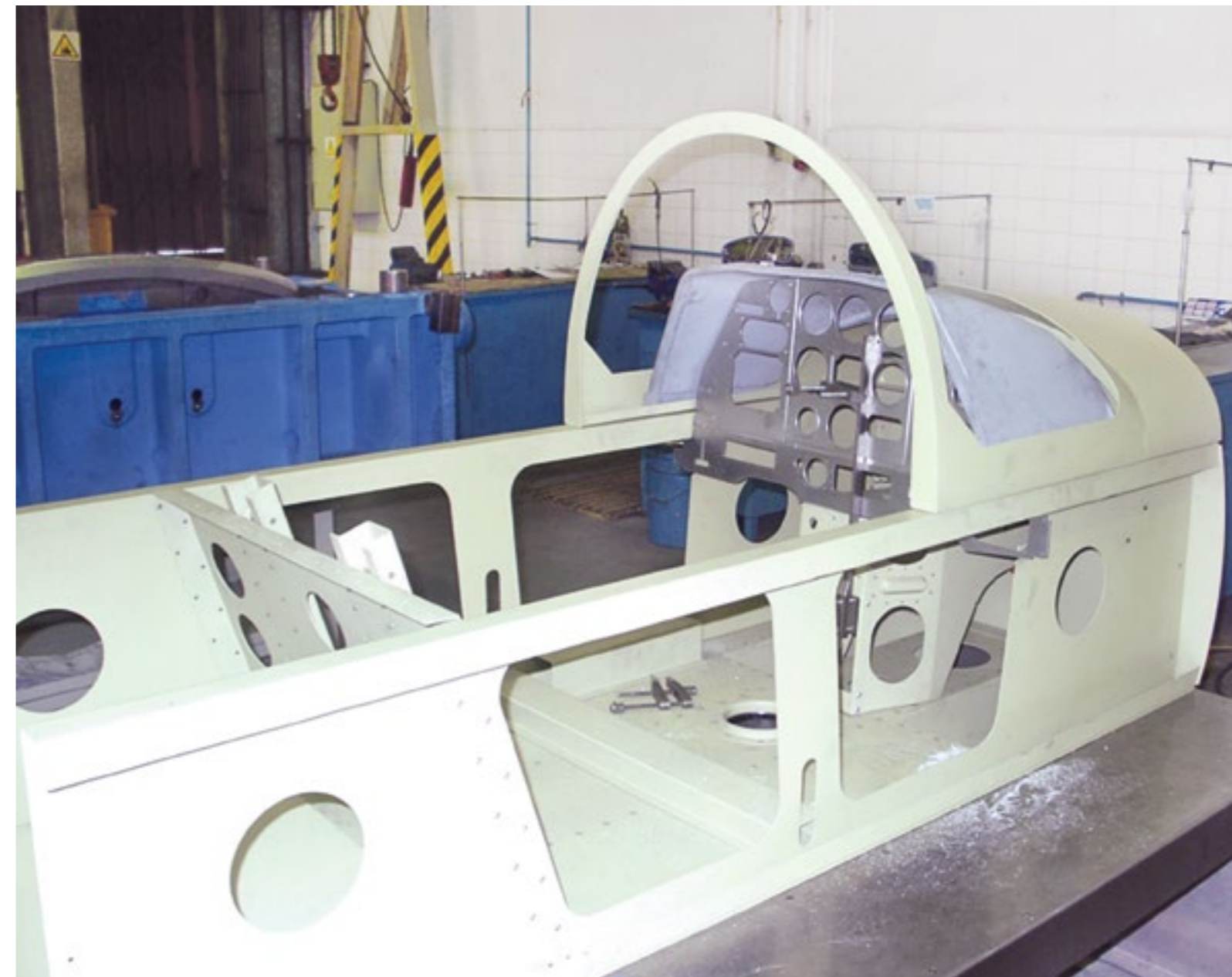
Our facilities allow us to have a wide area of tool and die with all equipment and conditions for assemble and adjusting our tools, maintenance of existing, large mechanical structures and jigs construction and welding area.

The search for means of production, faster, integrated, intuitive and functional is a constant concern for us, example is the software we use, both in CAD and CAM, the same used in all important industries, automotive and aeronautical. We have a design department specialized in 3D CAD, integrated with our CAM Software. With our hardware and software we are prepared for any engineering challenge.

The good relationship with our clients, fast and personalized service, effective and concrete budgeting, price/quality, dedication, professionalism in all our works and partnerships are our lines of orientation.

Our link to the Automotive, Aeronautic, Food and Maintenance Industries has more than three decades.

We have gathered the conditions that allow us to respond to the requests of our costumers and therefore their satisfaction.





EFACEC

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ORGANIZATIONS SUPPLIED BY THE COMPANY

▶ CERN

ESO

▶ ESRF

ITER

TECHNOLOGY DOMAIN

▶ SOFTWARE

▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▶ Network Management (Energy Network Management System).
- ▶ Supervisory Control and Data Acquisition Field Automation.
- ▶ Power: Supplies, Transmission, Distribution, Generation.
- ▶ Converters for LHC.

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

Founded in 1948, Efacec is the largest Group in the electric field financed by Portuguese capital. It employs over 4600 people and is present in more than 65 countries, in five continents.

Efacec's business activities encompasses the areas of: Power Products, Automation, Transportation.

Efacec's focus on the international market, as well as its continuous investment in innovation and new technologies, along with highly skilled and motivated human resources, cementing the company's strong and sustained position at the forefront of the sectors where it develops its activities.

ANNUAL TURNOVER

€780 million

FIELDS OF EXPERTISE

Network Management

Network Optimization, Energy Management and Operations Management (Forecasting, Short circuit analysis)

SCADA System Operation

Control and Supervision of Electrical Substation information; Alarms and alerts received in real-time for situational awareness and decision support; Historic Data archiving and Reporting support.

Field Automation

Protocol translation to IEC60870-5-104 from different third party IEDs using multiple communication protocols, high reliability, local archiving and local human machine interface, Clock Synchronization.

Power Supplies

Auxiliary power supplies for the LHC (Large Hadron Collider) particle accelerator. PS booster multipole correction magnets. Linac 2/3 & PSB transfer lines.

Converters for LHC

Four quadrant power converters. DC switch mode converter modules. Power converters modules (MaxiDiscap and MiniDiscap). AC/DC-DC converter modules. MAXIDISCAP power converter up to 1kV.

MAIN PRODUCTS AND SERVICES

DMS/SCADA for the CERN Electrical Distribution Network

Efacec provided CERN, with a SCADA/DMS system and associated Remote Terminal Units for more than 50 substations, providing integrated operation of the electrical power network for the large scale laboratory including the LHC.

It monitors and controls CERN electrical distribution network. Hardware is installed in every substation collecting data and controlling third parties IED. This installation achieved the following goals: increased security in operation for persons as some equipments are suggested to strong electrical fields; real time data delivery; cost reduction.

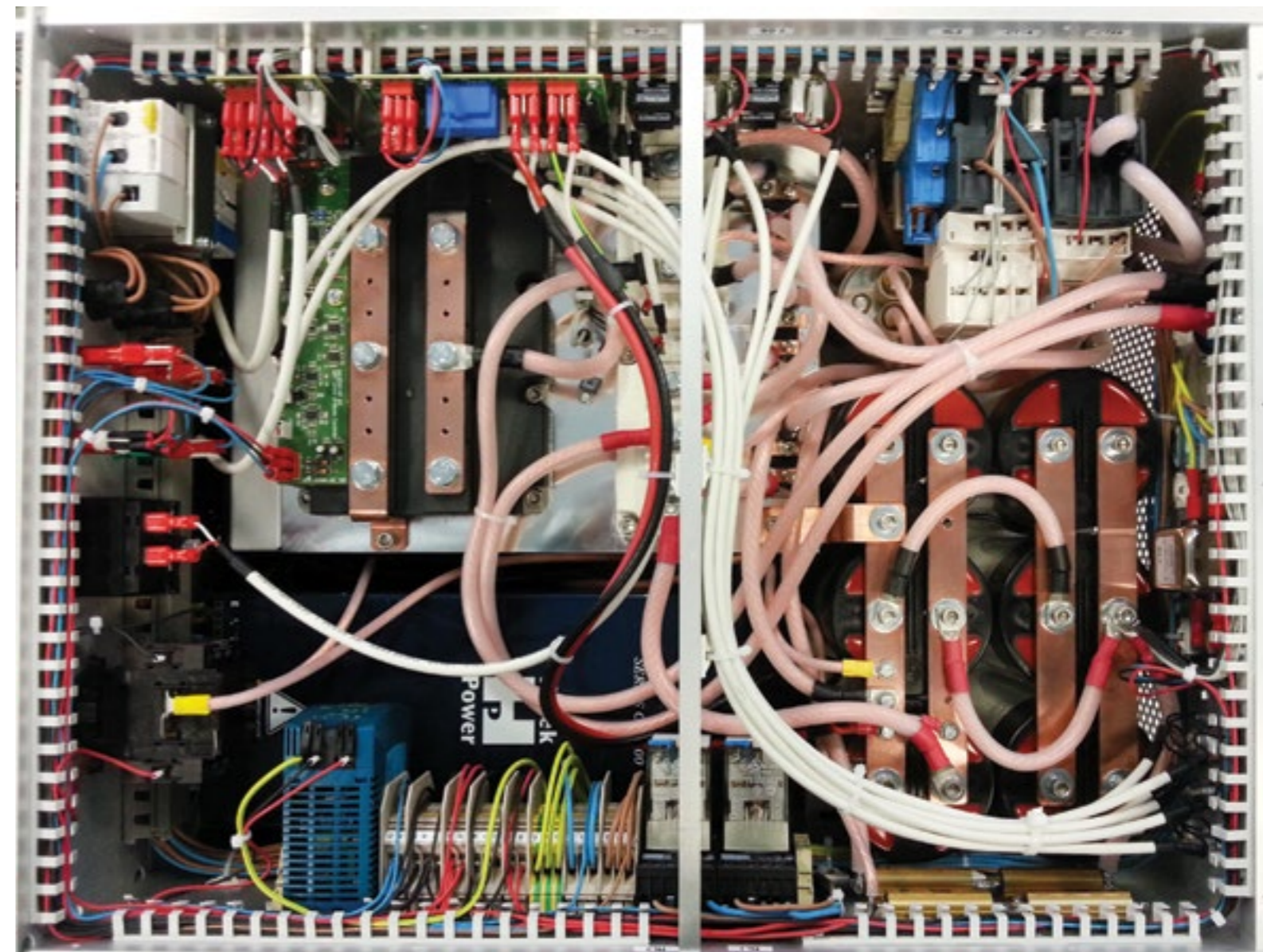
MAXIDISCAP power converters

The operating principle of the MAXIDISCAP converter is based on the charge and discharge of a capacitor bank: the capacitor bank is charged (with voltage that can be up to 1kV) by the charging unit and then discharged in the inductive load by the discharge system. The discharge current is a trapezoidal pulse with a flat-top generated by the high power IGBT used in linear mode.

Four quadrant power converters for LHC and auxiliary power supplies

This project included 342 power converters of 4 quadrant 120A/110Vdc for LHC particle accelerator and 40x 4 quadrant DC/DC switch mode converter modules +/-250A +/-600V (7 cabinets for power converters).

It also included 35x electronic interface modules for the energy extraction facilities (DQPIB/DQPIQ), 15x power converters modules and 1000x discharge heater power supply.





EXATRONIC
- ENGENHARIA ELECTRÓNICA, LDA.

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ORGANIZATIONS SUPPLIED BY THE COMPANY

CERN

▶ ESO

ESRF

ITER

TECHNOLOGY DOMAIN

▶ SOFTWARE

▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Integrated Schematic Capture and PCB
- ▼ Peer review of electronic Project documentation
- ▼ Design and development of electronic systems
- ▼ Firmware and embedded coding

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

Exatronic is a leading partner for R&D in technological processes related to the development of new products based on electronic engineering. We also perform supply chain management of customer products – procurement, purchasing and production of customer products, also when the R&D process was made by third parties.

Exatronic offers hardware, software and firmware experience to their R&D department for product development, compliance testing, Industrialization and supply chain management of customer products.

ANNUAL TURNOVER

€1.4 million

FIELDS OF EXPERTISE

Design & Development

For our design and development activities, we use E-CAD Altium Designer and M-CAD SolidWorks Premium, ATMEL, Microchip, ARM and NTX microcontrollers, ZigBee, XBee and other radio communications in the ISM bands. We design analogue and digital electronic circuits, Systems on Chip (SoC) FPGA, IP Cores and VHDL. We use thermal imaging for the thermal design of electronic circuits. We develop firmware and software, according to IEC 62304, with VisualStudio, Eclipse, Xcode and LPCXpresso.

Electronic Production

We ensure supply chain management: PCB sourcing up to HDI; procurement and purchasing of electronic components; PCB population and testing with automated optical inspection and flying probe; fast turnaround for small and medium series.

Compliance

Working with Accredited Laboratories we are able to verify the products' conformity with the applying directives, to verify the "CE" mark.



MAIN PRODUCTS AND SERVICES

Enhanced Project Cycle

Exatronic offers hardware, software and firmware experience to their R&D department for product development, compliance testing, Industrialization and supply chain management of customer products.

Exatronic carry out the technical feasibility analysis, build up the whole R&D process together with the customer, manufacture the solution and finish by delivering the new product. Exatronic supports every customer in his supply chain. Our light structure makes it possible to provide faster and better products with an overall competitive price.

By integrating a complete offer, such as electronics, firmware, mechanics, technical support and dedicated logistics, we can help our customers to compete at the leading edge in the world of electronics.

Electronic Engineering

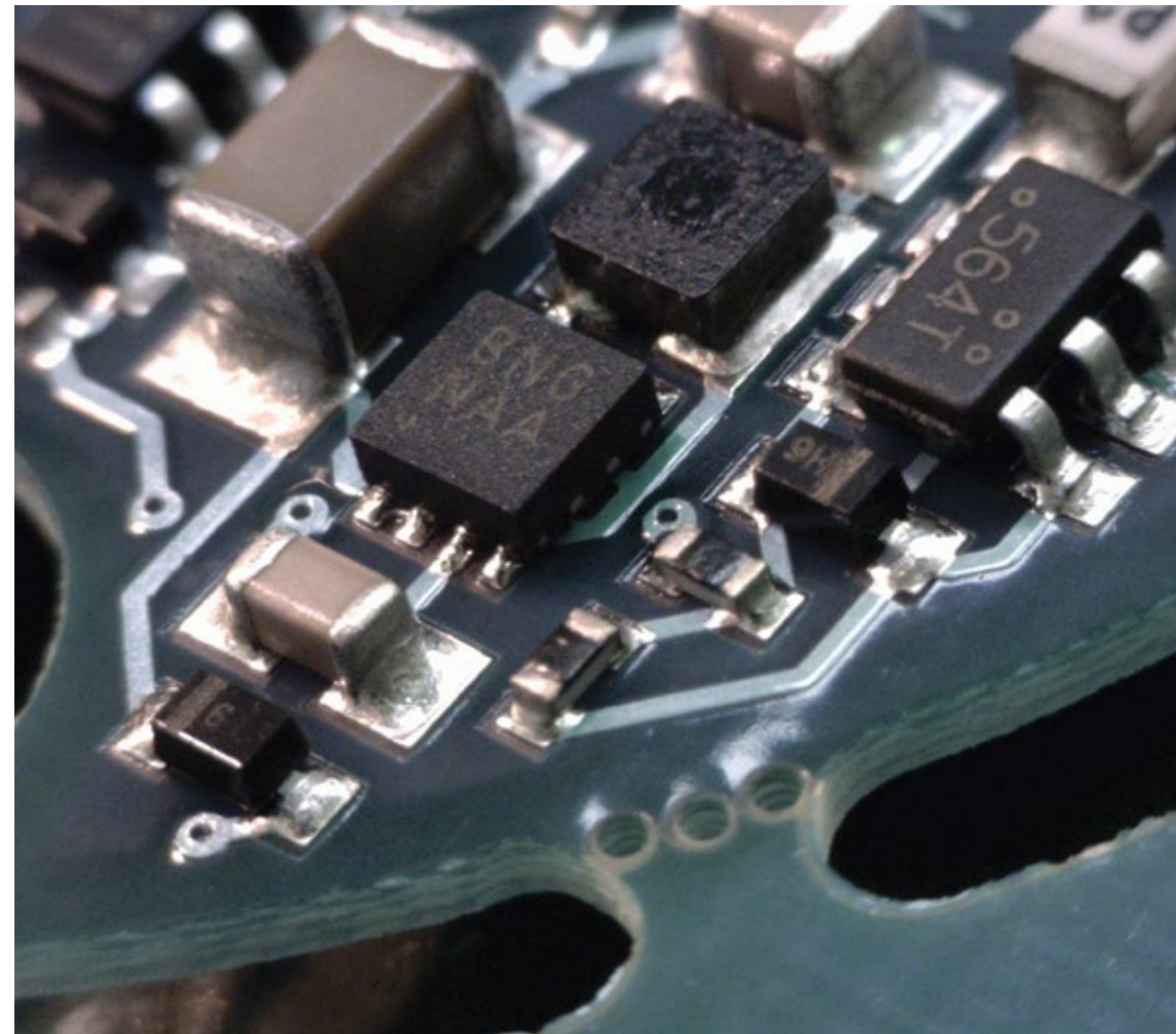
Integrated Schematic Capture and PCB design; DFM analysis; Peer review of electronic Project documentation; Design and development of electronic systems; Design of Analogue and Digital circuits; Firmware and embedded coding.

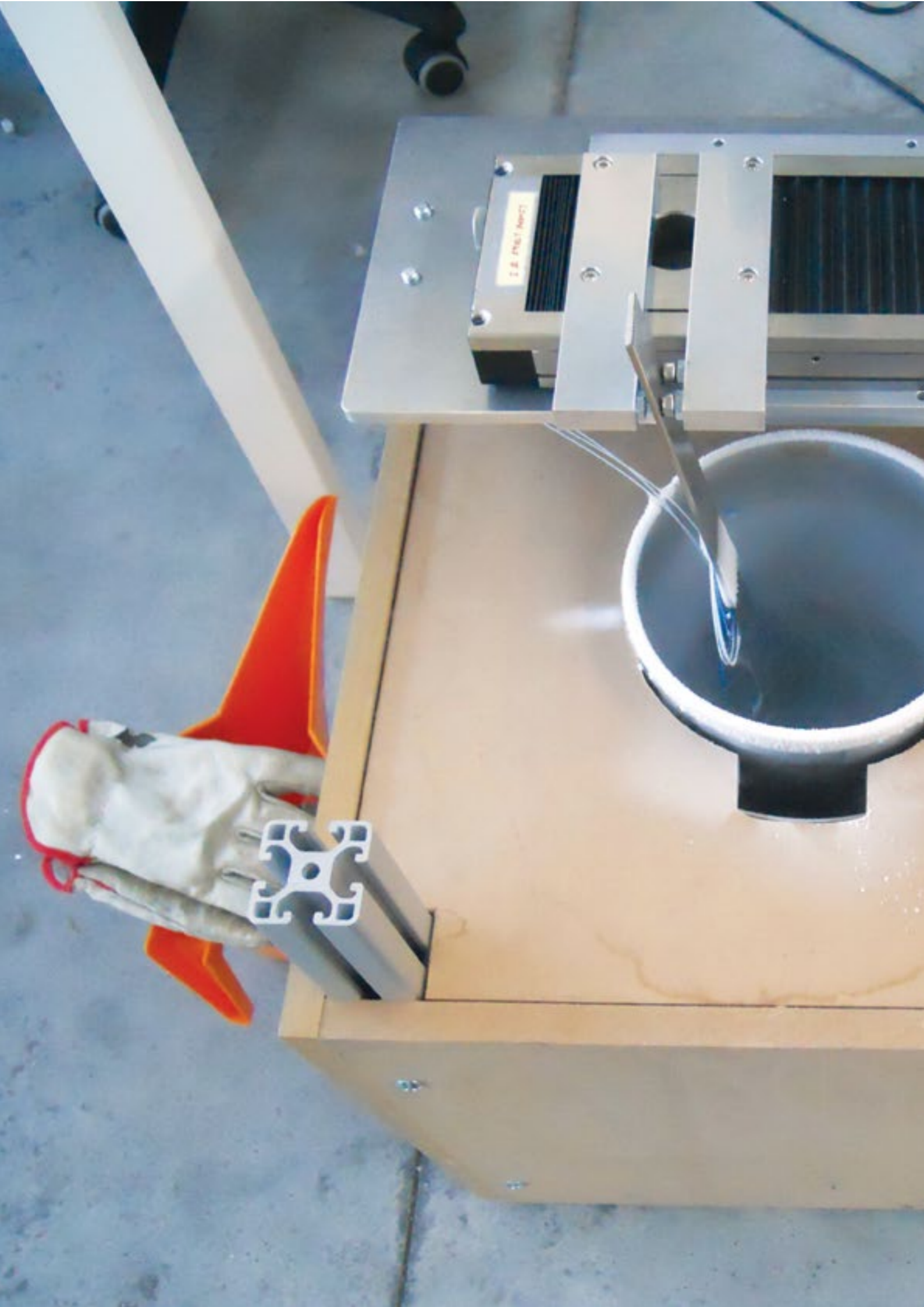
Rapid Prototyping

Prototype & small series assembly; Prototyping of plastic parts; Prototyping of metallic parts.

Electronic Production

PCB Population and testing; procurement and purchase; fast turnaround for small and medium series.





**FIBERSENSING
- SISTEMAS AVANÇADOS DE
MONITORIZAÇÃO, S.A.**

www.fibersensing.com

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**ORGANIZATIONS SUPPLIED
BY THE COMPANY**

CERN
ESO
ESRF

▶ ITER

TECHNOLOGY DOMAIN

▶ SOFTWARE
▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

▼ Fiber Bragg Grating Technology

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

FiberSensing develops and produces in-house fiber optic sensor systems for advanced monitoring applications, based on Fiber Bragg Grating (FBG) technology. The company provides Sensors, Measurement Units, Software and Complete Solutions, primarily in a OEM basis, for the Construction, Energy, Aerospace, Industry and Transportation markets.

The company is certified in accordance with ISO 9001:2008 standards and is supported by a team of highly skilled and qualified technicians, whose competencies go from fiber optic technology to optoelectronics, digital electronics and instrumentation.

ANNUAL TURNOVER

€1.7 million

FIELDS OF EXPERTISE

Optical sensing systems for the ITER superconducting magnets

Qualification and supply of optical sensing systems based on the Fiber Bragg Grating (FBG) technology to measure strain, displacement and temperature in the following environments:

- High radiation
- High vacuum
- Cryogenic - liquid helium temperatures

The first phase of the work includes the adaptation, test and qualification of FBG sensors, measurement units and software for the particular constraints of the ITER superconducting magnets.

A second phase will consist of series production, delivery and installation of the sensing systems.

MAIN PRODUCTS AND SERVICES

Optical Sensors based on FBG (Fiber Bragg Grating) technology and Fabry-Perot interferometers

The consortium FiberSensing and Smartec will provide strain, displacement and temperature optical sensors based on FBG (Fiber Bragg Grating) technology to be installed on coils and on different mechanical structures.

The contract adds to a previous order of ITER to SMARTEC to supply laser distance meters for the same application.





GLINTT INOV

www.glantt.com

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ORGANIZATIONS SUPPLIED BY THE COMPANY

▶ CERN

ESO

▶ ESRF

ITER

TECHNOLOGY DOMAIN

▶ SOFTWARE

▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▶ Information Architectures (open source)
- ▶ Business and Competitive Intelligence
- ▶ Electronics and Robotics
- ▶ Big Data Analytics and Cloud computing systems

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

Glantt Inov is the research and innovation company of Glantt - Global intelligent Technologies - one of the biggest Portuguese technological companies and is quoted in NYSE Euronext Lisbon. It operates in Europe, Africa and Latin America - growing ICT Company with more than 20 years of experience focused in the technological challenges to boost society and organisations sustainable productivity.

ANNUAL TURNOVER

€100 million

FIELDS OF EXPERTISE

In Glantt Inov, S.A we've a large team of engineers and researchers working hard to provide insights and technological solutions for the following industries:

- Banking, Insurance & Other Financial Services
- Telecommunications
- Health, Pharmacy & Social Care
- Industry and Logistics
- Government
- Blue Growth Economy (Waterborne transport, ports & logistics, fisheries & aquaculture)

We are than 1,250 consultants and researchers with knowledge on the following areas:

- Project Management (PMI and Prince2 Certified)
- Software engineering (with strong expertise in open-source technologies)
- Databases technologies (open source, Oracle, Microsoft, etc)
- Hardware, Robotics and Electronics engineering
- Sociology, Anthropology and Economy experts
- Software Quality Assurance (ALM consultancy, testing and technology assessment methodologies, etc)
- Human Factors experts (Design, Usability, Ergonomics)
- IT Standardization



MAIN PRODUCTS AND SERVICES

GLINTT INOV offer solutions in information systems and highly specialized services as well as a variety of technological areas that encompass:

- Databases
- Application Servers
- Development of Tailor-Made Solutions
- Implementation of Application Solutions
- Implementation of Decision Support Systems
- Implementation of Web Portals
- Implementation of Biometric & Security Solutions
- Implementation of Open Source Solutions
- Helpdesk & Outsourcing

We are also able to provide several ICT services, such as:

- Development of Computerized Projects: Our project teams prepare and implement computerized projects based on the appropriate methodology for each type of project.
- Tailor-Made Development Services: If your organization has specific requirements, environments or circumstances that are not correctly supported by standard market solutions, we conceive Tailor-Made solutions.
- Decision Support Systems: Development, implementation and integration of Datawarehouse Solutions and Decision Support.





**INDÚSTRIA DE COMPONENTES
MECÂNICOS DE FREIXIEIRO, LDA.**

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**ORGANIZATIONS SUPPLIED
BY THE COMPANY**

▶ CERN

ESO
ESRF
ITER

TECHNOLOGY DOMAIN

- ▶ SOFTWARE
- ▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Designs, manufactures,
assembles scissor lift tables

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

The INCOMEF, has a wide experience in metalworking and hydraulic over 50 years, presents a wide range of lift systems that find application in various sectors and aimed at meeting the needs of costumers.

ANNUAL TURNOVER

€863 K

FIELDS OF EXPERTISE

INCOMEF is a company specialized in the design and manufacturing of hydraulic lift platforms (column lifts and scissor lifts tables). Other load lifting systems, dock levellers and special lifting equipments.

MAIN PRODUCTS AND SERVICES

At CERN

Instalation of special hidraulic scissor lift tables MEX 100-06.

Ten scissor lift tables used in LHC Project - special MEX 5-30.





ISQ

www.isq.pt

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OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

The ISQ is a private Portuguese entity, established in 1965, with a Group turnover, in 2012, of 87M€ (58% overseas) and a staff in the order of 1300, a permanent presence in 23 countries. Founded in 1965 as an independent third party to monitor and certify welding activities to high quality standards. Some of ISQ areas of expertise are Engineering, Testing, Technical Inspections and Research and Development. ISQ has 21 accredited laboratories.

Over than 5 M€ are annually reinvested in R&D for developing new engineering techniques and solutions with participation in over than 400 international R&D projects.

ANNUAL TURNOVER

€87 million

FIELDS OF EXPERTISE

INSPECTIONS

Competence in all areas of industry including metallic and mechanical constructions, lifting equipment, pipelines.

VERIFICATIONS

Conformity assessment body in the areas of inspection, calibration and testing, notified body (0028), ISQ supports the industry to ensure structures, equipment and facilities are in accordance with national and international standards.

ENGINEERING

Maintenance strategy and organisation, maintenance and inspection engineering (FMECA, RBI, RCM, SIL) and material selection methodologies.

TESTING

21 accredited laboratories. Experience in designing and implementing non-standard tailor-made test setups. Design, manufacturing and operation of special test Benches. Development of tools for thermo-mechanical testing. Instrumentation and electronics.

MAIN PRODUCTS AND SERVICES

INSPECTIONS

- Third party inspections.
- Non-destructive evaluation.
- In-Service Inspection solutions
- Safety.

VERIFICATIONS

- Conformity Assessment Body for Inspection.
- Notified Body (NB028) for a wide range of european directives.
- Design review and assistance in conforming with required standards.

ENGINEERING

- Integrity management.
- Structural integrity.
- Customized test design and special projects.
- NDE engineering.

TESTING

- 21 accredited laboratories (Materials, Non Destructive, Metrology, Environment and chemistry, Vibrations, Electromagnetic Compatibility, Thermodynamics).



ORGANIZATIONS SUPPLIED BY THE COMPANY

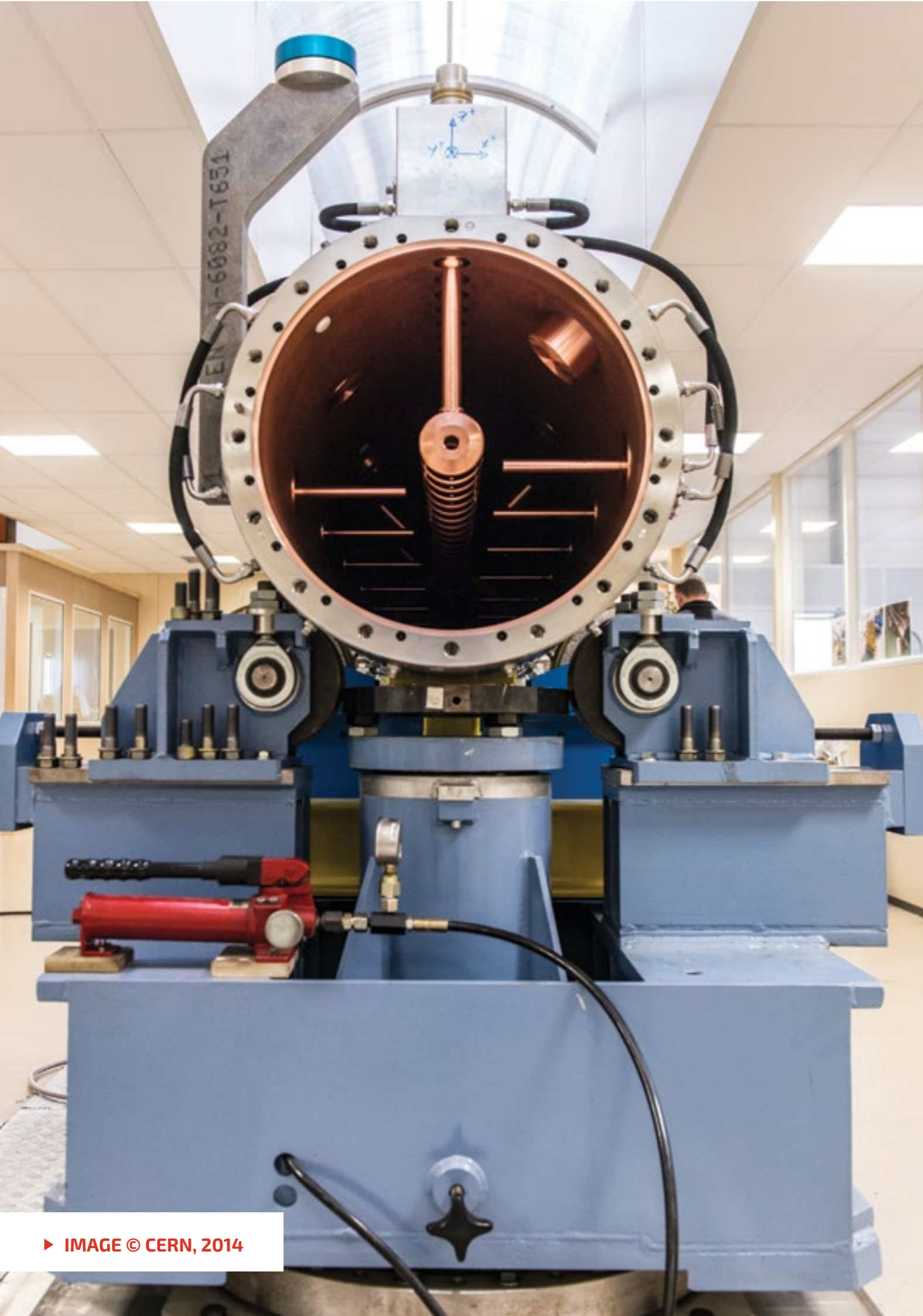
- ▶ CERN
- ▶ ESO
- ESRF
- ▶ ITER

TECHNOLOGY DOMAIN

- SOFTWARE
- ▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▶ Non-destructive inspections
- ▶ Quality Assurance
- ▶ Quality Control



**NCP
- FABRICO DE PRODUTOS
METÁLICOS, S.A.**

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**ORGANIZATIONS SUPPLIED
BY THE COMPANY**

▶ **CERN**

ESO
ESRF
ITER

TECHNOLOGY DOMAIN

SOFTWARE
▶ **HARDWARE**

TECHNOLOGY SUB-DOMAIN

- ▼ Aluminium, stainless steel and carbon steel welded parts
- ▼ Tube and sheet laser cutting
- ▼ Assembling of Mechanical parts

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

The company NCP – Fabrico de Produtos Metálicos,SA is in the field of metalworking, engaged in the manufacture of metal parts, using raw materials such as sheets and tubes in carbon steel, stainless steel and aluminium.

It is a company that uses extremely flexible production technologies in their production processes, such as laser cutting and other numerical control equipment, which has enabled it to produce for markets as diverse as construction, metal furniture, components for industry car and 2 wheels, parts and accessories for machines and general industry.

The company is certified ISO 9001:2008, Bureau Veritas.

ANNUAL TURNOVER

€5 million

FIELDS OF EXPERTISE

Fields of expertise for CERN

Tube and sheet laser cutted parts.

Bended parts.

Aluminium, stainless steel and carbon steel welded parts.

Assembled Mechanical parts.

MAIN PRODUCTS AND SERVICES

Main services for CERN

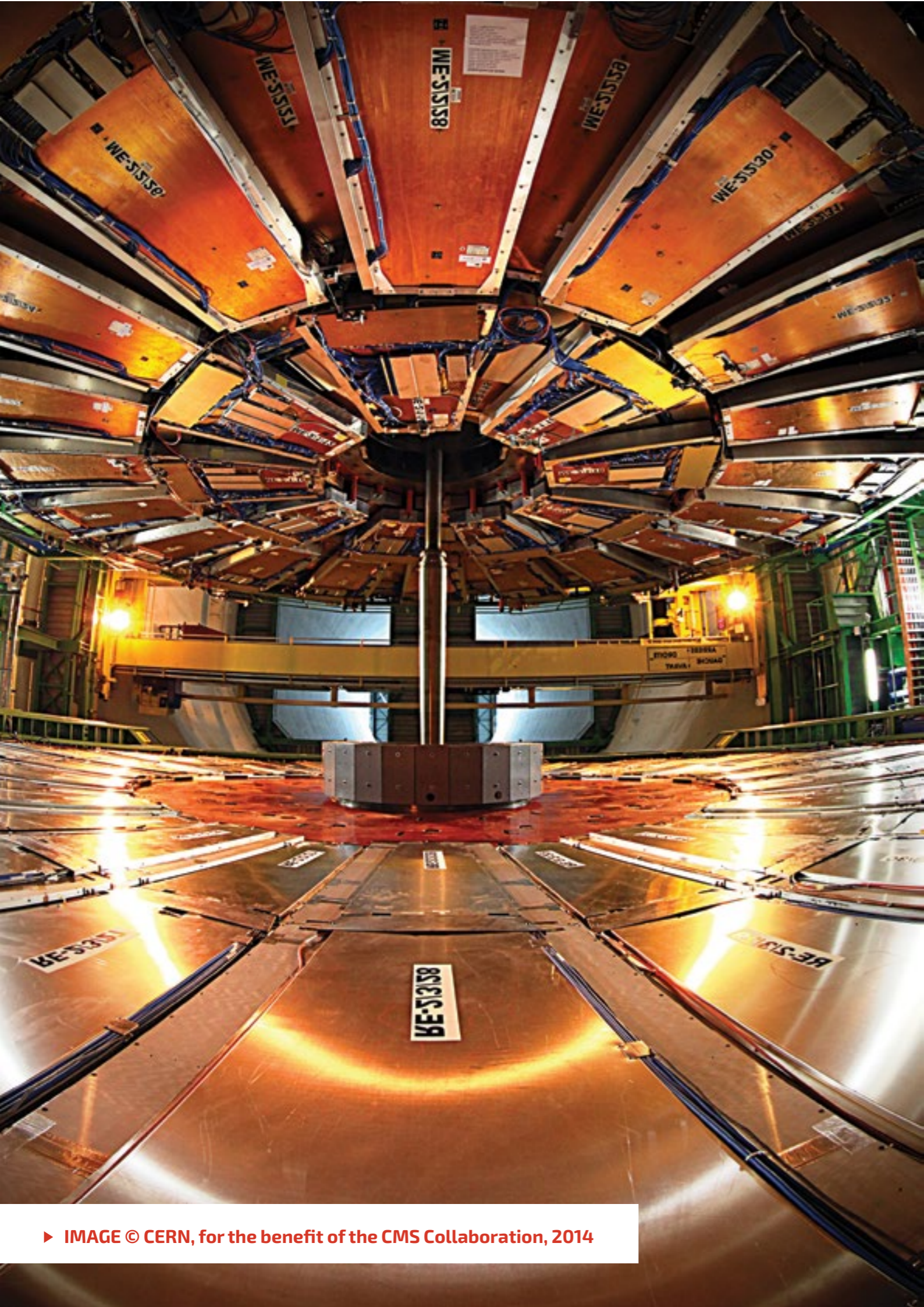
Fabrication of aluminium welded parts.

Assembling of Mechanical parts.

Supply of tube and sheet laser cutted parts.

Supply of bended parts.





OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

Our core competence
Industrial equipment designer and manufacturer.

Our guarantee to customers
Full commitment to meet the most demanding requirements.

Our goal
To be recognized as a competitive and reliable worldwide partner.

Our Mission
We are an industrial equipment designer and manufacturer, fully committed to meet the most demanding requirements of the most demanding industrial customer worldwide.

Our capacity to supply Turn Key solutions make us a preferential supplier of precision equipment's and tools for the industry.



SIROCO, S.A.
SOCIEDADE INDUSTRIAL DE
ROBÓTICA E CONTROLO

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ANNUAL TURNOVER

€3 million

FIELDS OF EXPERTISE

Machining of Precision

- Prototype manufacturing
- Tools and accessories manufacturing
- Execution of small and medium series

MAIN PRODUCTS AND SERVICES

Industrial Equipments

- Industrial automation solutions
- Assembly lines
- Robotized cells
- Automatic testing systems
- Others according customer request

Crimping Tools

- This Siroco branded product was specifically developed for the harness industry.
- The product range covers all possible applications, from standard ones to the specially developed according the specific needs of a specific customer.
- This equipment can either be used in individual working places or in automated production equipment's.
- The complete range we offer allows the handling of terminals with transversal sections from 0,13mm² to over 50mm².
- Our products are individually tested and validated in our laboratories with functional, dimensional, traction and capability tests, along with metallographic cuts.
- We ensure the supply of all replacement parts.

Machining of Precision

- Prototype manufacturing
- Tools and accessories manufacturing
- Execution of small and medium series

ORGANIZATIONS SUPPLIED BY THE COMPANY

▶ CERN

ESO
ESRF
ITER

TECHNOLOGY DOMAIN

SOFTWARE

▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Manufacturing of precision parts



SolidAl
Condutores Eléctricos, S.A.

**SOLIDAL,
CONDUTORES ELÉCTRICOS, S.A.**

www.solidal.pt

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**ORGANIZATIONS SUPPLIED
BY THE COMPANY**

▶ CERN

▶ ESO

ESRF

ITER

TECHNOLOGY DOMAIN

SOFTWARE

▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▶ Insulated Electrical cables up to 220kV
- ▶ Conductors for electrical aerial lines
- ▶ Underground High Voltage turn key projects

OVERVIEW AND GENERAL DESCRIPTION OF THE COMPANY

SOLIDAL was created in 1969, to produce insulated aluminum cables for low voltage. From 1969 until now the volume of production, the range of products, and their technological level was growing always, by means of a continuous investments and improvements in the plant, test equipment and people formation.

Actually SOLIDAL is a player in the field of transport and distribution of electrical energy, supplying conductors for aerial lines and insulated cables for low voltage, medium voltage, and high voltage up to 220kV.

ANNUAL TURNOVER

€105 million

FIELDS OF EXPERTISE

Low Voltage Aluminum Insulated Cables

Medium Voltage Aluminum and Copper Insulated Cables

High voltage Aluminum and Copper Insulated Cables

MAIN PRODUCTS AND SERVICES

Medium Voltage cables / CERN

From 2010, SOLIDAL is supplying copper and aluminum Medium Voltage Cables to CERN, with particular characteristics.

The cables were installed in the new Medium Voltage Lines that supplies the accelerators, and in the replacing of old lines.

Medium Voltage cables / ESO

In 2010, SOLIDAL supplied the Medium Voltage cables for the ALMA project in Chile. Our cables were installed in the two 28km circuits that supplies the antennas in the Chajnantor, from the bottom of the mountain, where are installed the electrical power plant that supplies the Alma telescope.



RESEARCH INSTITUTIONS



▶ IMAGE © ITER Organization, 2014

RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

CERN

- ▼ C2TN
- ▼ CFTP
- ▼ CICECO
- ▼ I3N
- ▼ LIP
- ▼ SIM

ESO

- ▼ CIDMA / GR@V
- ▼ CITEUC
- ▼ IA
- ▼ SIM

ESRF

- ▼ CDRSP
- ▼ CICECO
- ▼ IBMC
- ▼ ITQB
- ▼ LNEG
- ▼ REQUIMTE

ITER

- ▼ IPFN
-

TECHNOLOGY DOMAIN

SOFTWARE

- ▼ C2TN
- ▼ CFTP
- ▼ CITEUC
- ▼ REQUIMTE
- ▼ CIDMA / GR@V
- ▼ I3N
- ▼ IACE
- ▼ IPFN
- ▼ ITQB
- ▼ LIP
- ▼ LNEG
- ▼ SIM

HARDWARE

- ▼ C2TN
- ▼ CDRSP
- ▼ CFTP
- ▼ CICECO
- ▼ I3N
- ▼ IA
- ▼ IPFN
- ▼ ITQB
- ▼ LIP
- ▼ REQUIMTE
- ▼ SIM

OTHER

- ▼ IBMC
-



C2TN
- CENTRO DE CIÊNCIAS E
TECNOLOGIAS NUCLEARES -
INSTITUTO SUPERIOR TÉCNICO

<http://goo.gl/D4ADq2>

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RESEARCH INSTITUTION IS USER
AND HAS COLLABORATION(S) WITH:

► CERN

ESO

ESRF

ITER

TECHNOLOGY DOMAIN

► SOFTWARE

► HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Nanoscopic Materials characterization
- ▼ Radioactive Nuclear Physics Techniques
- ▼ Position sensitive electron detectors
- ▼ Planning and implementation of hardware experimental setups

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

AIM

Perform research in the field of advanced materials using unique radioactive nuclear techniques.

WHERE

At ISOLDE-CERN using radioactive ion beams, where the Portuguese teams have built and continue to develop an experimental infrastructure.

WHO

Since 1986 a collaboration has been established by CFNUL and former ITN. Today, students and seniors from universities with tradition and expertise in materials science (UA-CICECO, UP-IFIMUP, UTAD-CQ) are working together, in complement and synergy, with the universities excelling in nuclear methods, (IST/C2TN and UL-CFNUL), in addition to a larger international collaboration.

FIELDS OF EXPERTISE

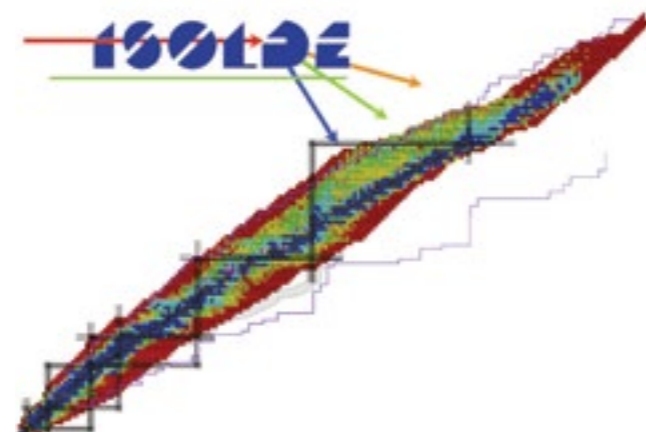
TECHNIQUES

EMISSION CHANNELING probes the lattice site of radioactive impurities in materials with sub angstrom resolution by detecting emitted charged particles with position sensitive Si pad electron detectors, developed at CERN for high energy physics.

HYPERFINE radioactive nuclear techniques measure nanoscopic scale charge distributions and magnetic fields, with dynamic ns time resolution, ideal to follow the electronic - atomic process in the nano-materials world.

RADIOACTIVE ION BEAMS

At ISOLDE-CERN 1.4GeV p-beams from the Proton-Synchrotron Booster (PSB) impart on different target materials for fast production of a wide range of radioactive isotopes. Different, state-of-the-art, ion sources extract the radioactive nuclei in large amounts with high elemental purity to be further mass separated by magnets and delivered to the experiments in the fields of nuclear and atomic physics, solid-state physics, materials science and life sciences.



MAIN R&D PROJECTS AND SERVICES

ORGANISATION OF WORK and DELIVERABLES

- RESEARCH subjects are firstly approved by the ISOLDE scientific committee (INTC) in order to get beam time for experiments.

- COORDINATION of the Portuguese teams and of the experimental infrastructure working at ISOLDE is assumed by researchers of IST-C2TN and then by the local contacts at each university, institute or research industry.

- R&D and maintenance of the Portuguese experimental infrastructure at ISOLDE, the access to beam times and related work at ISOLDE and Portugal are funded by FCT-projects.

- DELIVERABLES are gaining insight into fundamental physics processes in materials, training and thesis.

- NATIONAL & INTERNATIONAL teams work together on each approved proposal, which presently address a variety of research subjects:

IS585 - Stabilization and interaction of ad-atoms on graphene.

IS580 - Determination of TM lattice sites in dilute magnetic semiconductors and in oxides that are candidates for "single ion ferromagnetism."

IS515 - Studying binding of Pb, Hg, Cd heavy metals on magnetic nano-particles.

IS481 - p-type and transition metal (TM) doping of Ga2O3, ZnO, AlN... nano-wires.

IS453 - Study of Mg and Be dopant lattice sites in III-nitride semiconductors.

"Emission channeling (EC) lattice location studies in semiconductors using highly pixellated TimePix detectors" - a collaboration program of tests and commissioning of 512x512 55micron pixel timepix Si detectors aiming at high resolution EC experiments.





CENTRE FOR RAPID AND SUSTAINABLE PRODUCT DEVELOPMENT, INSTITUTE POLYTECHNIC LEIRIA

<http://cdrsp.ipleiria.pt>

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RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

- CERN
- ESO
- ▶ ESRF
- ITER

TECHNOLOGY DOMAIN

- SOFTWARE
- ▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Structural Biology

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

The Centre for Rapid and Sustainable Product Development of the Institute Polytechnic Leiria is a research centre of excellence in the field of mechanical engineering. We have earned this position through our leadership in innovative interdisciplinary research. Our research is at the leading edge of mechanical engineering and focuses on emerging technologies, advanced materials together with sustainable manufacturing and green technologies as broad strategic areas.

FIELDS OF EXPERTISE

We are experts in the design and manufacturing of specialised engineering systems with computer control.

We use CAD software to develop the design which enables the production of the system in different parts of the world but with equivalent performance and characteristics.

We have in-house x-ray facilities to allow the system to be fully tested by expert engineers and scientists.

We use this type of equipment to prepare scaffolds for use in regenerative medicine.

We have considerable expertise in the development of software for both control purpose to facilitate remote and integrated control as well as for analysis of complex data particular in real-time allowing feedback to the engineering system.

MAIN R&D PROJECTS AND SERVICES

We develop specialised sample environments for the study of polymers and other advanced materials using the bright x-ray beams available at the ERSF.

We develop novel manufacturing stages such as electrospinning, 3d-printing, extrusion and shear flow devices to use the bright x-ray beams available at the ESRF to follow that manufacturing process so that the process and the materials can be optimised.

We use the high resolution nanoZZto quantitatively probe the 3-d structure of scaffolds and regenerated tissue with a scaffold to optimise the design of scaffolds and the process of regenerative medicine.

We have a high expertise in the development of software for data analysis of the scattering data obtained at the ESRF which arises from the complex structures in advanced materials especially the structure which develops during processing.



▶ IMAGE © Denis Morel, ESRF



CENTRO DE FÍSICA TEÓRICA DE PARTÍCULAS

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RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

► CERN

ESO
ESRF
ITER

TECHNOLOGY DOMAIN

- SOFTWARE
- HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Higgs Physics
- ▼ Flavour Physics: Fermion Masses Mixing and CP violation
- ▼ Search for new Physics including Supersymmetry, Dark Matter
- ▼ Hadronic Physics

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

CFTP has 20 members with a PhD, 14 faculty members and 6 Post-Docs and about ten PhD and M.Sc students. The work of CFTP is dedicated to scientific research and advanced training and has been classified as Excellent in all international evaluations promoted by FCT.

CFTP is the leading Portuguese research group in Theoretical Particle Physics, with a high degree of Internationalization. CFTP has a very strong connection to CERN, it has established close ties with several European Universities through several EU networks, as well in other parts of the world (e.g. JLab) and is competitive and recognized at the international level.

FIELDS OF EXPERTISE

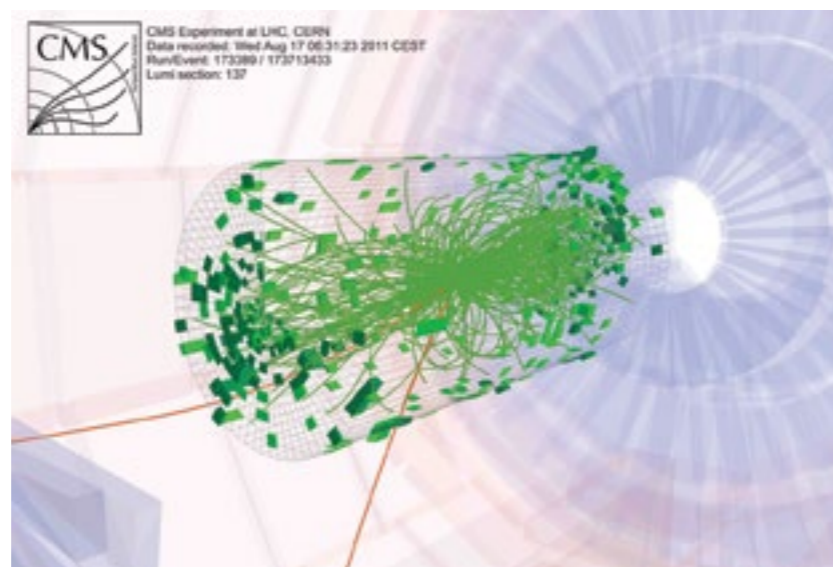
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MAIN R&D PROJECTS AND SERVICES

The work of CFTP is closely related to the research done at CERN and we aim at taking full advantage of our scientific connection with the Theory Division at CERN.

The members of CFTP actively participate in many of the workshops organized at CERN, make frequent short term visits to the Theory Division at CERN for collaboration work and also spend Sabbatical leaves as Scientific Associates at CERN. Furthermore, we also present our work at CERN in several different occasions.

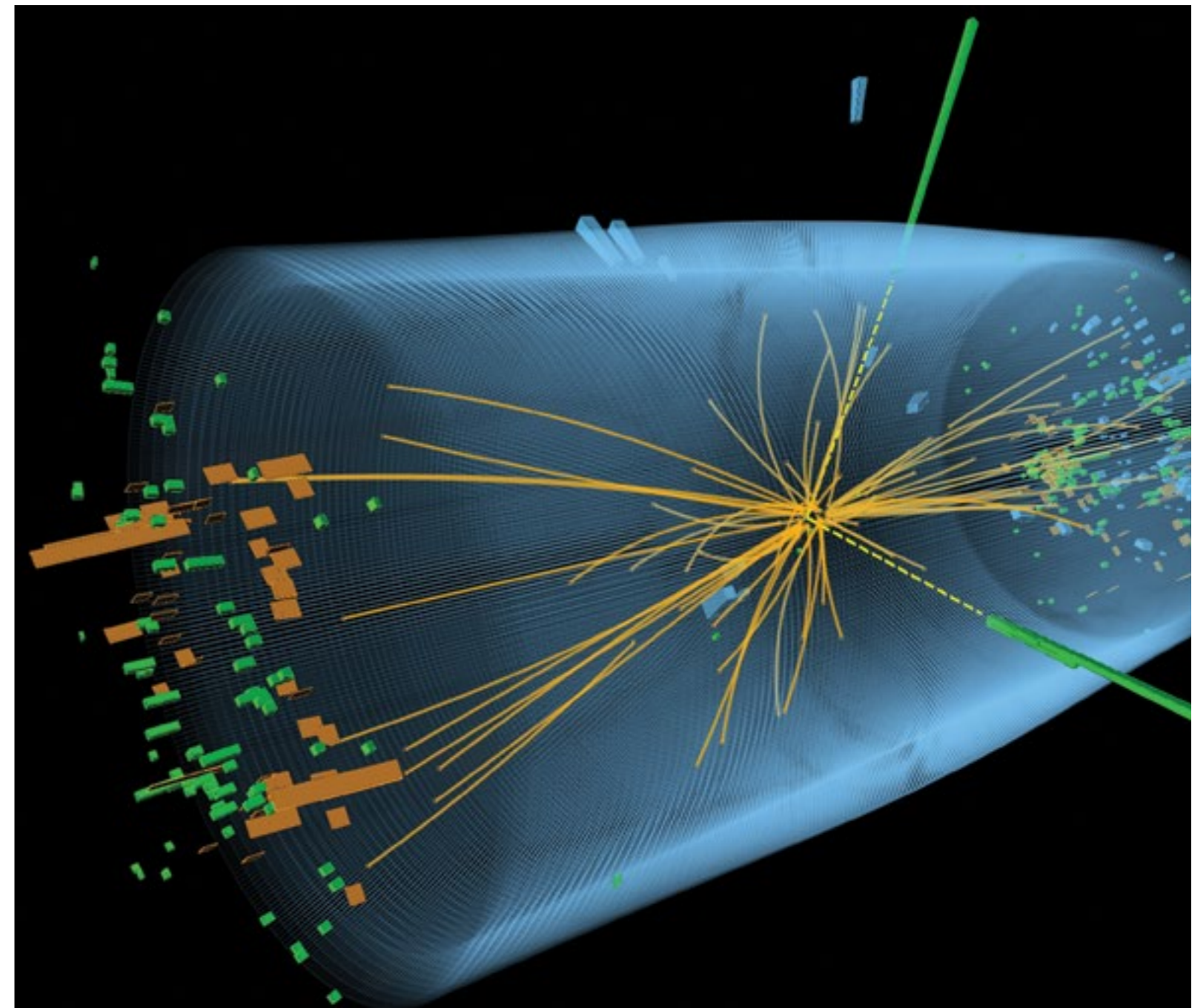
We also send our students to CERN for short term visits to let them take full advantage of the intense research environment provided by CERN.

CFTP often participates in the organization of International Scientific Meetings both in Portugal and abroad with an important participation of scientists from CERN.

Our Centre has a lively programme of seminars and we often invite CERN scientists to give talks in Portugal.

The members of CFTP have participated in the past in several of the Working Groups organized at CERN and are planning to continue actively doing so. This participation has led in some of the cases to joint publications. We also participate in Meetings organized at CERN to discuss the feasibility of future Experimental Projects and their strategic relevance for European Physics.

The connection of CFTP to CERN has given an important contribution to the internationalization of our research. We have produced many papers at CERN and in collaborations that started during our visits to CERN.



CICECO - CENTRE FOR RESEARCH IN CERAMICS AND COMPOSITE MATERIALS

www.ciceco.ua.pt

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RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

- ▶ CERN
- ESO
- ▶ ESRF
- ITER

TECHNOLOGY DOMAIN

- SOFTWARE
- ▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Radioactive isotope hyperfine probes
- ▼ Structure-properties relationship of functional materials
- ▼ Combination of micro-crystal and powder synchrotron data

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

Created in 2002 in Aveiro University, CICECO gathers scientists from the Departments of Chemistry, Physics and Materials Engineering. CICECO's main focus is on the synthesis, structure, properties, and modeling of new materials devices with a strong interface with industry.

'Centre for Imaging & Structure of Materials' and 'Centre for Materials Design & Technology' are important CICECO structures. The former manages the very extensive state-of-the-art equipment and lab facilities, while the latter is our interface with companies and external entities, ensuring knowledge transfer and assisting in identifying funding sources.

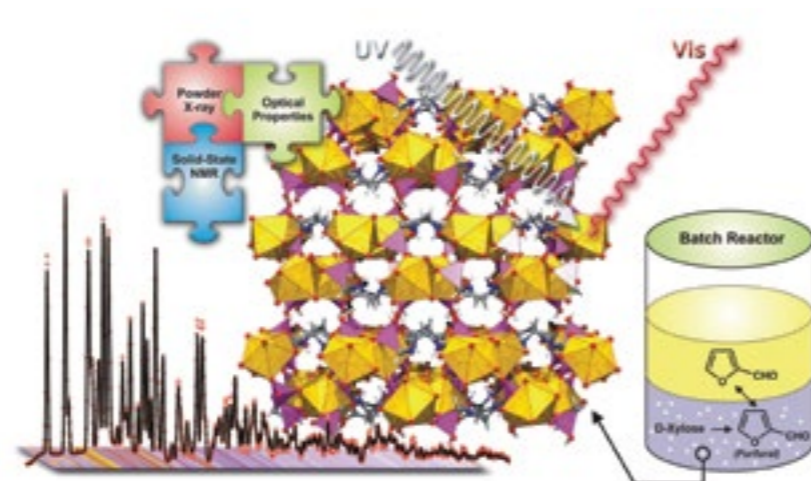
FIELDS OF EXPERTISE

CERN

Since 2001, leadership of international projects at CERN-ISOLDE laboratory, Geneva Switzerland, for the use of radioactive isotope hyperfine probes.

ESRF

Since 2005, leadership in Portugal concerning the use of high-resolution synchrotron radiation (powder and single-crystal) for the structural elucidation of complex hybrid materials (e.g., Metal-Organic Frameworks) and light-converting lanthanide silicates.



MAIN R&D PROJECTS AND SERVICES

CERN

Project IS-487 (2009-), "Study of Local Correlations of Magnetic and Multiferroic Compounds", involves research groups from Aveiro, Lisboa, L'Aquila, Orsay, Porto, Sacavém, Stuttgart, Moscovo, Tokyo, Tsukuba, Vila Real.

ESRF

Since 2005:

CH-2155, "New Microporous Transition-Metal Polyhedra", ID31

CH-2253, "New Rare-Earth Heteropolyhedra Luminescent Materials", BM01b

CH-2414, "Cyclodextrin Inclusion Compounds with Europium(III) Beta-diketonates", ID31

CH-2489, "Functional Microcrystalline Layered Lanthanide-Organic Frameworks", ID31

CH-2533, "Cyclodextrin Encapsulation of Biomimetic Organometallic Cancer Drug Candidates", ID31 + BM01a

CH-2832, "Lanthanide Silicates Exhibiting Unusual Photoluminescent Properties", ID11

CH-2915, "Cyclodextrin Inclusion of Biomimetic Cytotoxic Ruthenium Complexes", ID11

CH-3692, "Novel Functional Metal-Organic Frameworks with Phosphonate Linkers", ID31 + ID11

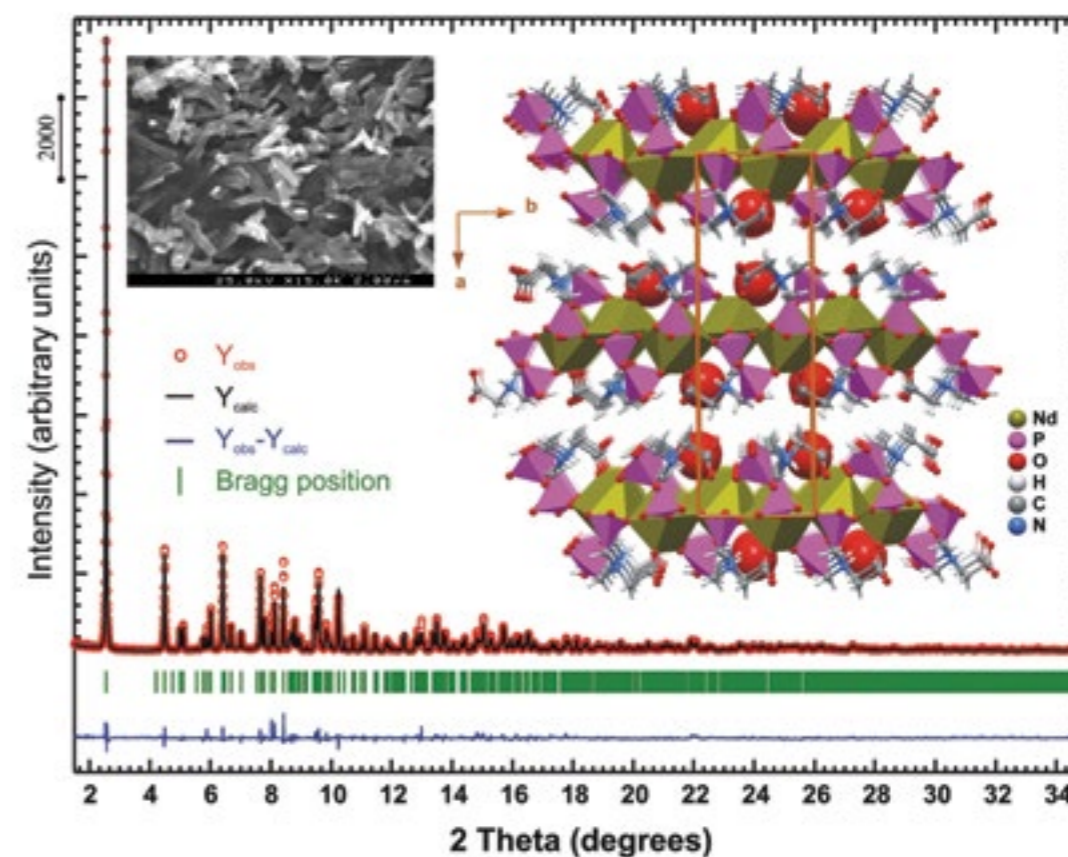
CH-3702, "Novel Lanthanide-Based Photoluminescent, Catalytic and Magnetic Metal-Organic Frameworks", ID31

CH-3613, "Large Polynuclear Metal-Based Materials", BM01a

CH-3718, "Bifunctional Lanthanide-Organic Frameworks with Polyphosphonate Organic Linkers", ID11

CH-3849, "Nanocluster based metal materials: cyclic Mn70 complexes", BM01a

CH-3994, "Anion exchange studies in photoluminescent clay-inspired Metal-Organic Frameworks", BM01b





CIDMA: CENTER FOR RESEARCH & DEVELOPMENT IN MATHEMATICS AND APPLICATIONS / GR@V - GRAVITATIONAL GEOMETRY AND DYNAMICS / UNIVERSITY OF AVEIRO

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RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

- CERN
- ▶ ESO
- ESRF
- ITER

TECHNOLOGY DOMAIN

- ▶ SOFTWARE
- HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Black Hole Physics
- ▼ Cosmology (Theoretical and Observational)
- ▼ Exoplanets
- ▼ Solar System Dynamics

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

The Center for Research & Development in Mathematics and Applications (CIDMA) is a research team hosted at the Department of Mathematics of the University of Aveiro. It was created in 2010 as a fusion between the research centers MA and CEOC, continuing the main goal of carrying out fundamental and applied research in several domains of Mathematics. The CIDMA is one of the largest mathematical research centers in Portugal having over one hundred members and collaborators, and its scientific activities are organized in eight research groups. One of these groups is Gr@v: Gravitational Geometry and Dynamics, that collaborates with ESO.

FIELDS OF EXPERTISE

Black Hole Physics (ESO): Black Holes are truly unifying objects of all physics that are governed by Einstein field equations.

Cosmology (ESO): Cosmology is the study of the large scale structure of the Universe, as well as its dynamics.

Exoplanets (ESO): An exoplanet is a planet outside the Solar System. In the Milky Way galaxy, it is expected that there are many billions of planets (at least one planet, on average, orbiting around each star, resulting in 100–400 billion exoplanets), with many more free-floating planetary-mass bodies orbiting the galaxy directly.

Solar System Dynamics (ESO): The gravity force acting over eons has provided the solar system with an intricate dynamical structure, much of it revealed by recent space missions. Mathematical tools and physical models are needed for a complete understanding of the subject.

MAIN R&D PROJECTS AND SERVICES

Black Hole Physics (ESO): We try to understand Black Hole's formation and dynamics. This requires the laws of all four fundamental forces, and their physics is relevant not only for astrophysics and cosmology but for a variety of topics within high energy physics.

Exoplanets (ESO): We study the long-term dynamics of known multi-planet systems. This allow us to test the accuracy of the orbital parameters' determinations, as well as to understand how these systems evolved. We also look for the stable zones in the gaps between already-known planets in order to determine where is it possible to locate Earth-like planets.

Cosmology (ESO): Our group has been involved in the study and development of cosmological models, in particular to explain the accelerated phases of the cosmological evolution, dubbed inflationary phases. Our work is both theoretical and observational.

Solar System Dynamics (ESO): This is a multi-disciplinary subject that combines expertises from Geophysics, Dynamical Systems, and Numerical Simulations. We study the geophysical effects that modify the spin and the orbits of planets and satellites, in particular tidal effects and core-mantle friction.



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RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

- CERN
- ▶ ESO
- ESRF
- ITER

TECHNOLOGY DOMAIN

- ▶ SOFTWARE
- HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Solar System
- ▼ Geology
- ▼ Geophysics
- ▼ Solar Physics

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

We are the only Portuguese center that is dedicated to research the Solar System as a whole and at all scales. This translates to strongly interdisciplinary regards over the Sun, Venus, Earth, Mars, Titan, and smaller bodies - for now. We are a medium-dimension team with training in geophysics, geology, physics, mathematics, astronomy and astrophysics. We are housed at the Geophysical and Astronomical Observatory of Coimbra University, the only one in Portugal with this broad spectrum of competences.

FIELDS OF EXPERTISE

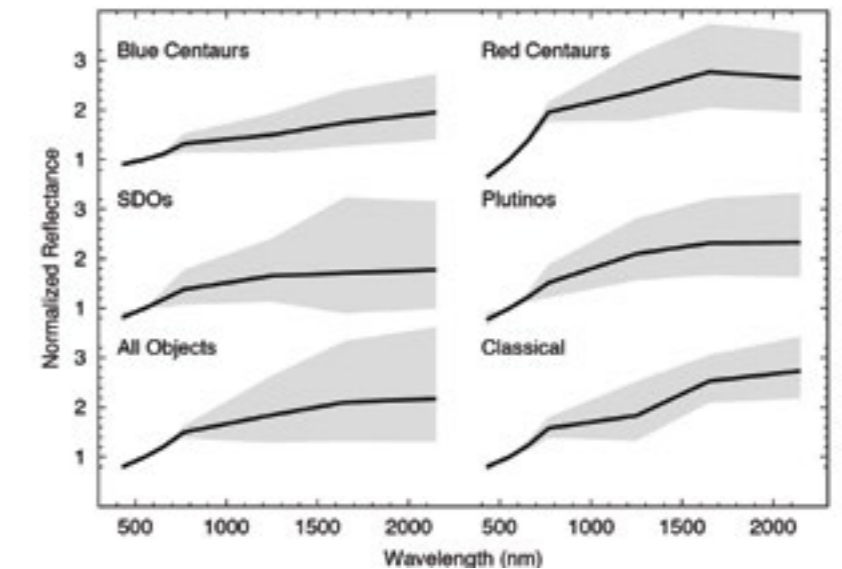
Our main contribution to the ESO activities is mainly on the study of small bodies, in particular, the Kuiper Belt Objects. This work have been done by one of our members (N. Peixinho) and is made under international collaborations, frequently, based on observations obtained by different ESO telescopes (as NTT and VLT).

MAIN R&D PROJECTS AND SERVICES

J. Fernandes was from 2009 to 2013 the national contact for the ESO Science Outreach Network.

N. Peixinho was a referee (panelist) of ESO "Observing Programs Committee (ESO-OPC)" to rank applications for ESO telescope time during 2010 (Periods P86 and P87).

N. Peixinho was Co-I of two past Large Programs of telescope observations on Kuiper Belt Objects: "ESO large program on physical studies of Trans-Neptunian Objects and Centaurs" (refs: 167.C-0340, 178.C-0036), is a Co-I of the on-going ESO Large Program: "A Magnitude Limited Survey of the Rotational Properties of Kuiper Belt Objects" (194.C-0207), and was Co-I and observer of several other short term observation programs.



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RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

► CERN

ESO
ESRF
ITER

TECHNOLOGY DOMAIN

- SOFTWARE
- HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Radiation detectors
- ▼ Micro-pattern gas detectors
- ▼ UV - photodetectors
- ▼ Electron drift simulation processes

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

I3N - Mission

I3N is a multidisciplinary Research Institute actively involved in fundamental and applied research in the area of Nanoscience and Nanotechnology.

His mission is to create and disseminate scientific and technical knowledge in the field, help to generate added value to our industry and to raise public awareness of the role of nano and science and nanotechnology.

The research and development related with CERN activities is done through the Radiation Detection and Medical Imaging (DRIM) group.

FIELDS OF EXPERTISE

The fields of expertise of I3N, related with the CERN activities, are within the Radiation Detection and Medical Imaging group:

Gaseous detectors

Development of gaseous detectors and new concepts of microstructures for amplification and readout in Micro-pattern Gaseous Detectors. These detectors were/are developed for different type of applications, ranging from high energy particle physics to medical imaging.

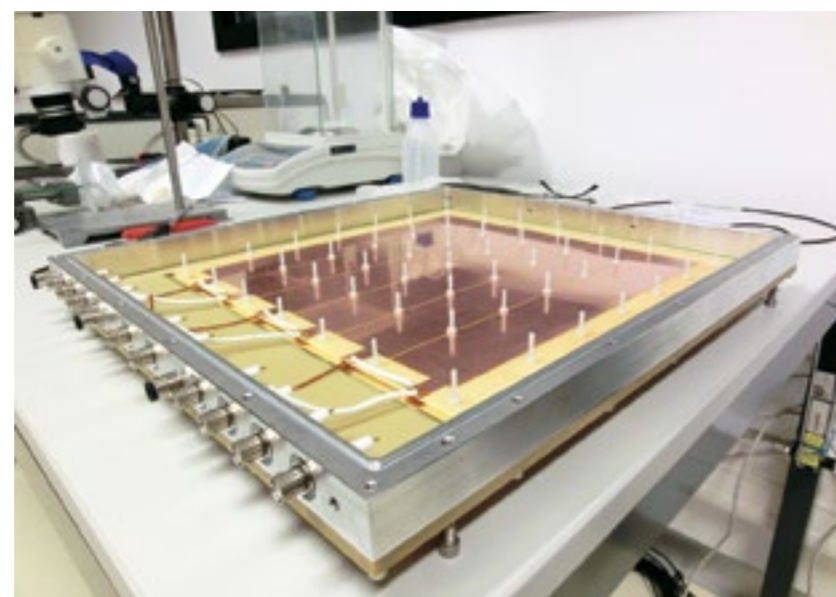
Gaseous photomultipliers

Development of single photon counting UV position sensitive Gaseous PhotoMultipliers (GPMs). Photon detectors as high as 30x30 cm² were successfully developed.

Electron drift Simulation

Simulation of the physical processes and detector response in gaseous detectors.

Development of simulation tools for electroluminescence assessment and implementation of methods and techniques to evaluate the effect of the charging up, in micro-pattern gaseous detectors.



MAIN R&D PROJECTS AND SERVICES

All the R&D projects described are in the CERN context and within the following collaborations:

COMPASS

Participation in the COMPASS experiment at CERN and participation in the RICH1 detector upgrade of COMPASS.

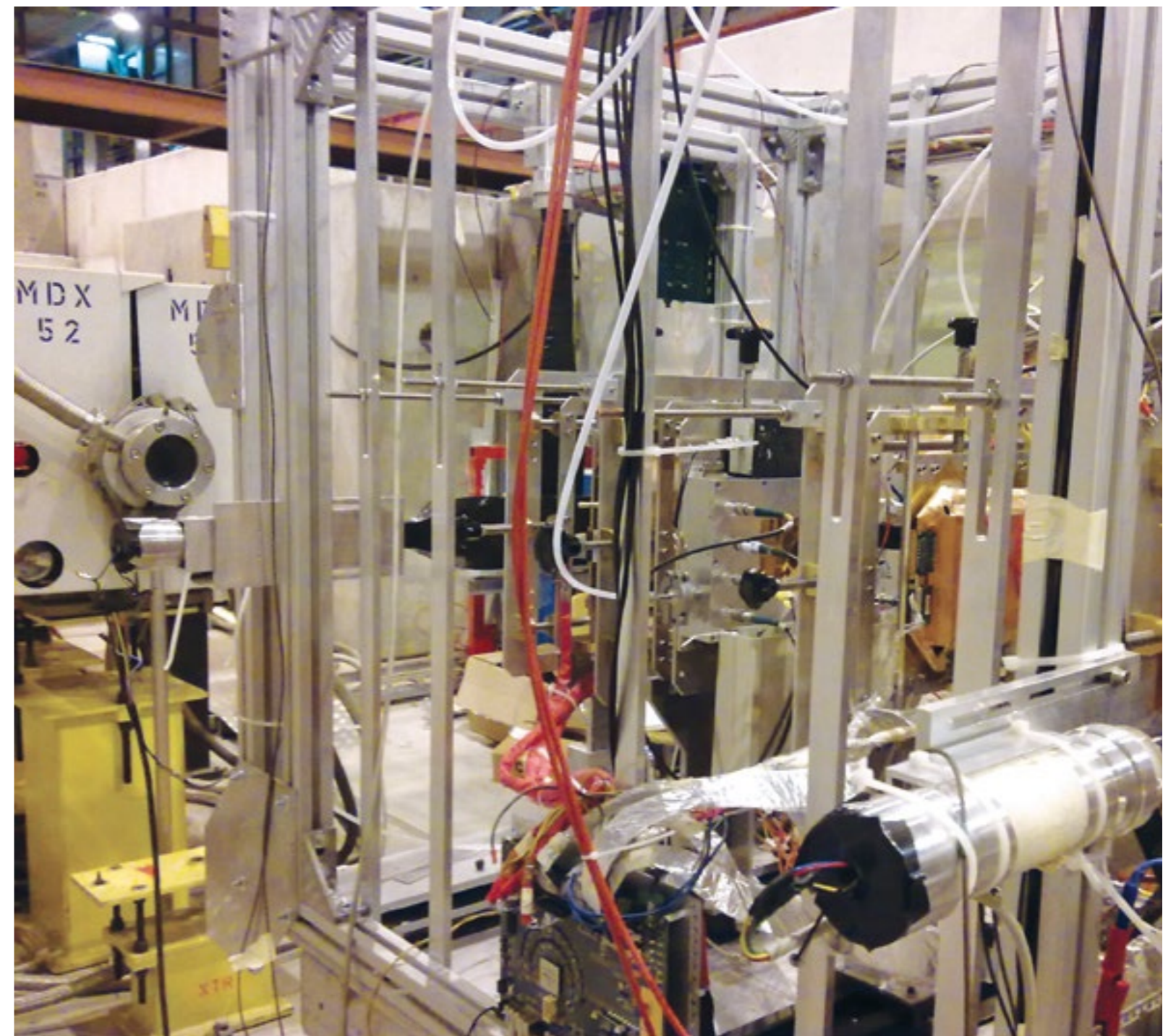
CERN RD51 collaboration, "Micro-Pattern Gas Detectors Technologies"

Participation in the CERN RD51 collaboration, with contributions for the following Working Groups (WG):

- WG1, MPGD Technology & new Structures
- WG2, Characterization
- WG3, Applications
- WG4, Software & Simulation
- WG7, Common Test Facilities

CALICE

Participation in the CALICE collaboration with the research and development of ThickGEM based detectors for Digital Hadron Calorimetry for the future International Linear Collider (ILC)





IBMC
- INSTITUTO DE BIOLOGIA
MOLECULAR E CELULAR

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RESEARCH INSTITUTION IS USER
AND HAS COLLABORATION(S) WITH:

- CERN
- ESO
- ▶ ESRF
- ITER

TECHNOLOGY DOMAIN

- SOFTWARE
- HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Structural biology

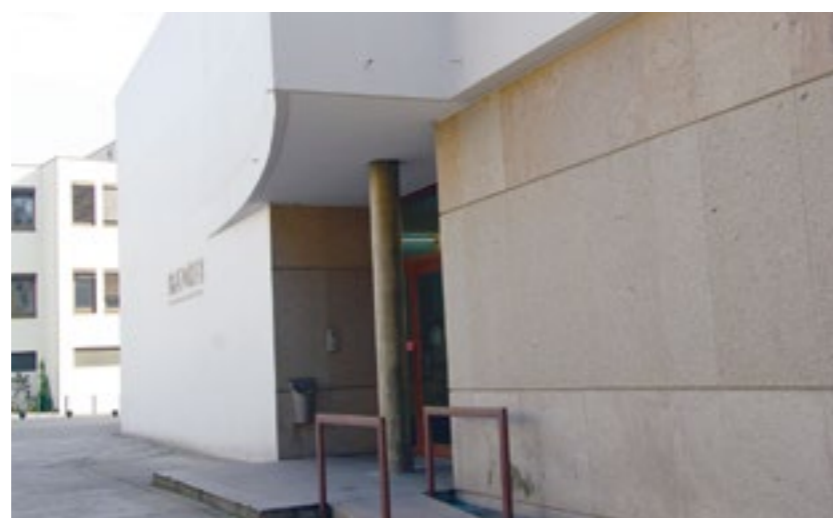
OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

IBMC is a non-profit association of public utility. Our main mission is to foster research in Life Sciences and Biomedicine, to promote postgraduate training and to encourage technology transfer and public engagement with science. With over 200 researchers distributed by 41 research groups running more than 160 funded projects per year, we work towards becoming an international leader in multidisciplinary research on fundamental biological problems, while pursuing scientific innovation and social progress. Since its foundation in 1997, IBMC has contributed to cutting-edge science within the University of Porto.

FIELDS OF EXPERTISE

Structural Biology

The teams at IBMC carry out advanced research in Structural Biology, addressing questions as diverse as the mode of action of ion channels, the mechanism of substrate/inhibitor recognition and specificity by biomedically relevant enzymes, and the self-assembly of proteins involved in neurodegenerative diseases. Studying the structural aspects of these biological questions demands using advanced X-ray sources, both for crystallographic and in solution approaches. Over the last few years the ESRF has been instrumental in providing access to high quality beam lines for X-ray crystallography and small angle X-ray scattering studies.



MAIN R&D PROJECTS AND SERVICES

Access to synchrotron radiation facilities

Within the Portuguese BAG (Block Allocation Group), the teams at IBMC carrying out research in the field of Structural Biology are regular users of the Macromolecular Crystallography and Small Angle X-ray Scattering (SAXS) beam lines of the ESRF. Access to high intensity and/or tunable X-ray sources is mandatory for modern Structural Biology. The data collected every year at ESRF by IBMC teams are incorporated in several of their highest impact publications (e.g. Rocha et al. (2011) Proc Natl Acad Sci USA 108, 14091-6; Figueiredo et al. (2012) Proc Natl Acad Sci USA 109, E3649-58; Vieira-Pires et al (2013) Nature 496, 323-8).

Characterization of macromolecular complexes and development of novel methodologies for experimental phase determination

In the scope of an ongoing scientific collaboration between the Biomolecular Structure Group of IBMC and the team of Dr. de Sanctis at ESRF, high resolution crystallographic models of macromolecular complexes - thrombin-bound natural proteic anticoagulants - have been determined. Additionally, a new methodology for experimental phase determination using affordable additions (UV lasers) to existing monochromatic X-ray sources (sealed tube and rotating anode diffractometers) was devised and published jointly by the two teams.



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**RESEARCH INSTITUTION IS USER
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CERN

▶ ESO

ESRF

ITER

TECHNOLOGY DOMAIN

▶ SOFTWARE

▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

▼ Astronomical Instrumentation

▼ Optical Metrology

▼ Astrophysics

▼ Astronomical Data Reduction & Analysis

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

The Institute of Astrophysics and Space Sciences (IA) is a new research infrastructure merging the two most prominent research units in the field in Portugal: CAUP (Porto) and CAAUL (Lisbon). IA is responsible for over two-thirds of the national productivity in international ISI journals in the area of Space Sciences, and its scientific and technological strategy has led to highly relevant results in the development of state-of-the-art astronomical instrumentation for ESO.

FIELDS OF EXPERTISE

IA instrumentation group has the following expertise areas:

Project activities:

- Instrument or subsystem concept
- Detailed optical and Tolerance analysis
- Design and integration of optomechanical systems/subsystems and control electronics (automation)
- Implementation of laboratorial prototypes

AIT activities:

- Alignment of complex optical systems
- Testing of radiometric systems
- Calibration of sensors
- Construction of tailored light-based alignment tools

OGSE activities:

- OGSE for instrument calibration & testing, working in relevant environment conditions (e.g., temperature, vacuum)
- Low level radiometry (V+NIR)
- Using active systems to mimic large range of operational conditions (e.g., zoom, adaptive optics)

Data pipeline & telemetry activities:

- Instrument simulation
- Data Calibration
- Data Processing
- Data Analysis
- Instrument control



MAIN R&D PROJECTS AND SERVICES

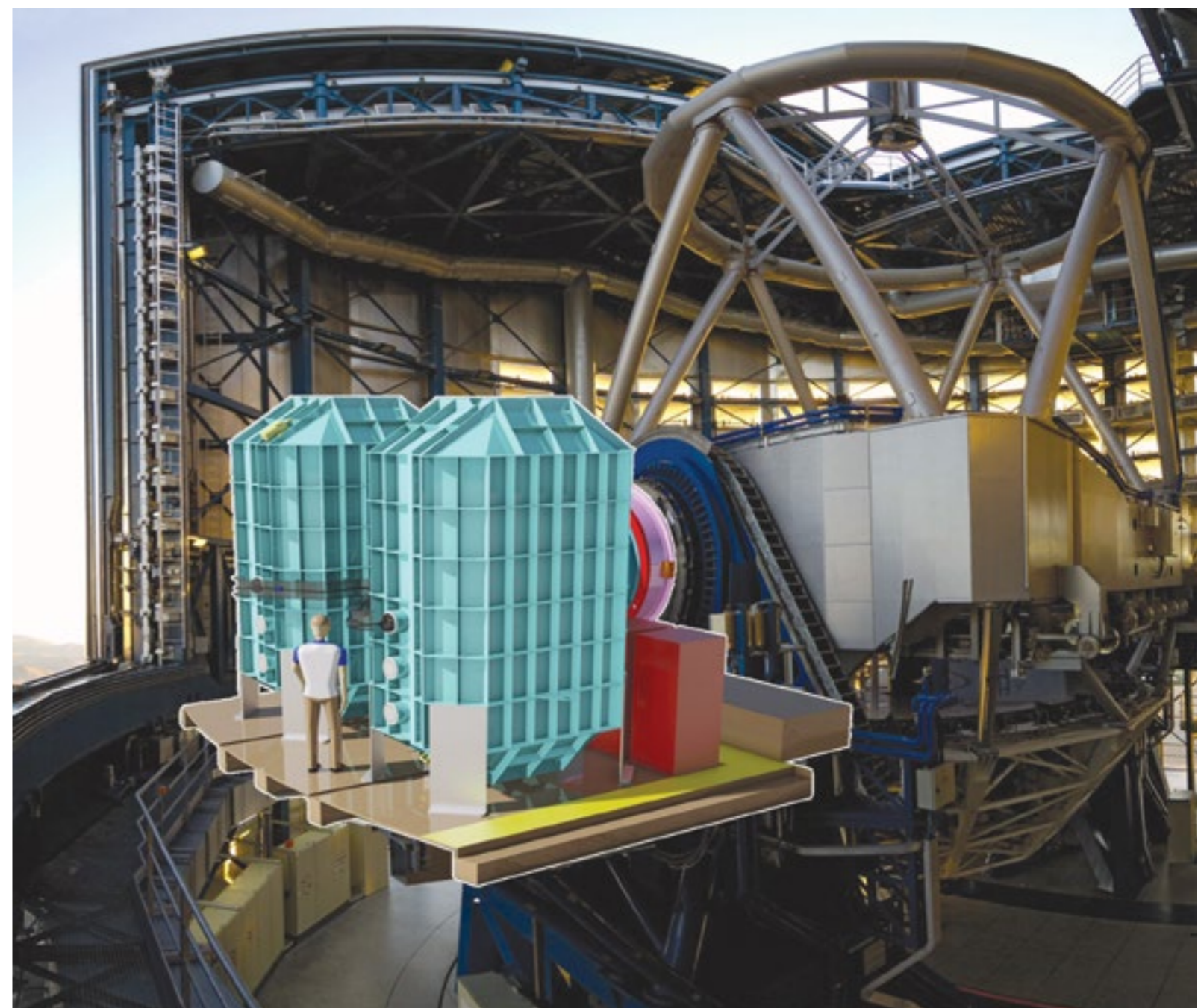
During the last few years, the IA instrumentation group has been increasing its participation in the construction of ESO instruments, strengthening its areas of expertise: optics, mechanics, control (hardware and software) and data reduction and analysis.

Namely on ESPRESSO, the group is leading the design of 4 Coudé Trains (for the 4 VLT) with the increased responsibility of having a large interaction with the VLT telescope infrastructure. The group is responsible for the assembly integration and test of the Coudé Train (atmospheric dispersion compensator, control electronics, and control software) and for the development of the data pipelines software that will set a benchmark for fiber-fed spectrographs.

In terms of software, the group is implementing the Data reduction software for instrument that requires very high (sub-m/s) precision to detect earth-mass planets.

The team has also been heavily involved with the design and construction of MOONS, a new wide-field multi-object spectrograph for the VLT. Besides being co-PIs for the overall project, IA is responsible for the VLT telescope field corrector lenses and also for all the front-end mechanics.

Emerging from the participation in these ESO projects, the group has recently started studying the implementation of an atmospheric dispersion corrector for HIRES, a high resolution spectrograph being designed for the E-ELT.



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**RESEARCH INSTITUTION IS USER
AND HAS COLLABORATION(S) WITH:**

- CERN
- ESO
- ESRF
- ▶ ITER

TECHNOLOGY DOMAIN

- ▶ SOFTWARE
- ▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Nuclear Fusion Diagnostics
- ▼ Control and data acquisition systems
- ▼ Nuclear Fusion
- ▼ Remote Handling

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

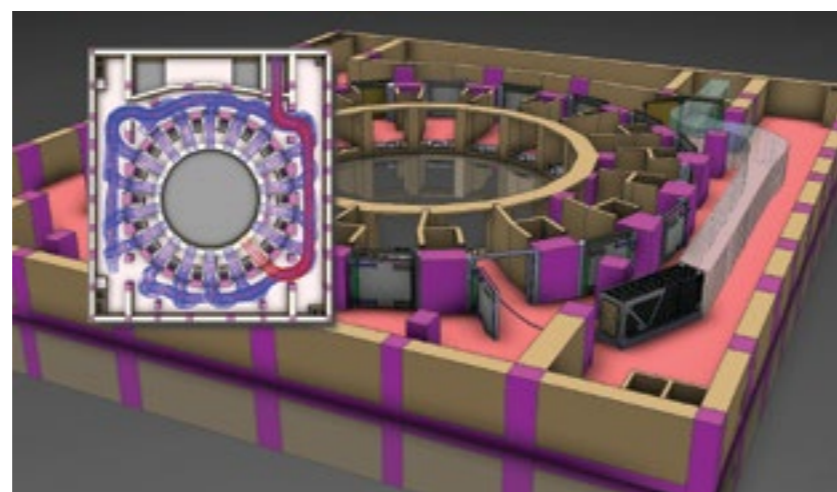
IPFN is a Research Unit of IST with expertise in Plasma Physics, Engineering and Technologies, Controlled Nuclear Fusion, Lasers and Photonics and Advanced Computing. IPFN has the statute of Associate Laboratory of FCT and was, until 2013, the Research Unit of the Contract of Association between the European Atomic Energy Community, Euratom, and IST. Euratom's flagship project is ITER, a large-scale scientific experiment for the generation of clean energy from fusion. IPFN is the sole Portuguese R&D institution in the area of Plasma Science and Engineering, and one of the top Physics laboratories in the country.

FIELDS OF EXPERTISE

IPFN's Engineering and Systems Integration group is strongly focused on:

- Diagnostics for the study of nuclear fusion plasmas;
- Data acquisition systems for nuclear fusion experiments;
- Studies for remote handling in nuclear fusion environments;
- Microwave high-frequency components to be used in nuclear fusion experiments;
- Computer codes to process and analyze data from nuclear fusion experiments;
- Computer codes to simulate diagnostic performance and nuclear fusion experiments;
- Studies of the chemical and micro structural changes undergone by materials in nuclear fusion experiments, in particular in-vessel due to the interaction with the plasma;
- New materials for application in nuclear fusion experiments.

The group is strongly focused on the development of systems for nuclear fusion experiments and in particular for ITER, having several projects in its portfolio.



MAIN R&D PROJECTS AND SERVICES

ITER Prototype Fast Plant System Controller

One prototype systems was developed based on the Advanced Telecommunications Computing Architecture (ATCA) standard, including development of ATCA modules targeting ITER requirements. The activity contributed to the ITER Plant Control Design Handbook effort of standardization, specifically regarding fast controller characteristics.

ITER Plasma Position Reflectometry Diagnostic

R&D (including prototypes of transmissions lines and microwave electronics), engineering, quality support and managerial activities, and testing from functional specifications, up to the supply of a final design and support for the production of Manufacturing Drawings for all components of the system as well as the final design for Electronics Components and for the data acquisition and real-time software.

ITER Collective Thomson Scattering Diagnostic

Development, optimization and detailed design of the front-end subcomponents, such as horns, mirrors, waveguides etc followed by their detailed engineering design including the mounting and fixtures of the components and integration of the diagnostic front-end into ITER port.

Activities related to the development of an Air Transfer System prototype and Cask Transfer System Virtual Mockup.

Activities related to the development of an Air Transfer System prototype and Cask Transfer System and Optimization of Trajectories for the Cask and Plug Remote Handling System in Tokamak Building and Hot Cell.





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QUÍMICA E BIOLÓGICA
- MACROMOLECULAR
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**RESEARCH INSTITUTION IS USER
AND HAS COLLABORATION(S) WITH:**

CERN
ESO
▶ ESRF
ITER

TECHNOLOGY DOMAIN

▶ SOFTWARE
▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

▼ Structural Biology

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

The Instituto de Tecnologia Química e Biológica (ITQB) is an academic research centre of the Universidade Nova de Lisboa. Its mission is to carry out scientific research and postgraduate teaching in chemistry, life sciences, and associated technologies, while also serving the community and performing university extension activities to promote science and technology.

Researchers at ITQB benefit from a highly multidisciplinary environment and outstanding research facilities, equipment, and scientific support services, some of which are unique in Portugal.

FIELDS OF EXPERTISE

Macromolecular Crystallography (MX) at the ESRF

The ITQB Macromolecular Crystallography Unit (MXU) has been an ESRF user since the early 1990s. In 1998, the ESRF implemented a Block Allocation Group (BAG) scheme whereby the MX groups in Portugal apply together for beamtime. The Coordinator of the Portuguese MX BAG is a member of the MXU (Pedro Matias). ESRF beamtime has remained the main source of synchrotron X-rays used by the MXU and data collected at the ESRF has resulted in many publications in peer-reviewed journals, including Nature, Science and PNAS.

Personnel exchange and Committee membership at the ESRF

Several members of MXU have become PhD students, pre-doctoral and post-doctoral researchers at the ESRF, and several PhD theses were awarded at ITQB based almost exclusively on research carried out at the ESRF. One of the ESRF SAC members (Maria Arménia Carrondo) is the head of MXU.

MAIN R&D PROJECTS AND SERVICES

Membrane Proteins (Margarida Archer)

Structural and functional characterization of membrane proteins from CDP-alcohol phosphatidyltransferase family, archaeal membrane transporters, full-length bacterial sensor kinases, and protein-ligand complexes.

Proteins involved in human disease (Colin McVey and Maria Arménia Carrondo)

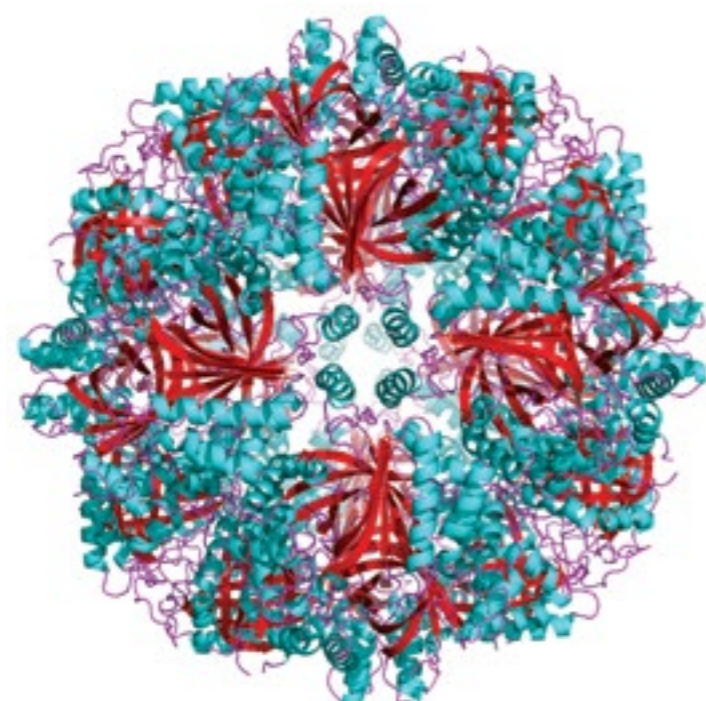
Structural characterization of key proteins from KSHV and MHV-68 involved in herpesvirus latency, with focus on the structure determination of required ligand interactions. Biophysical and structural characterization of the tumour suppressor Grim19 and its complex with target partners, namely mouse Olfactomedin 4 and vIFR1 from human herpesvirus 8.

AAA+ ATPases with cancer implications (Pedro Matias)

3D structure determination of full-length human RuvBL2 protein and of its complex with RuvBL1 protein; biophysical and structural characterization of their interactions with c-Myc and AGR-2.

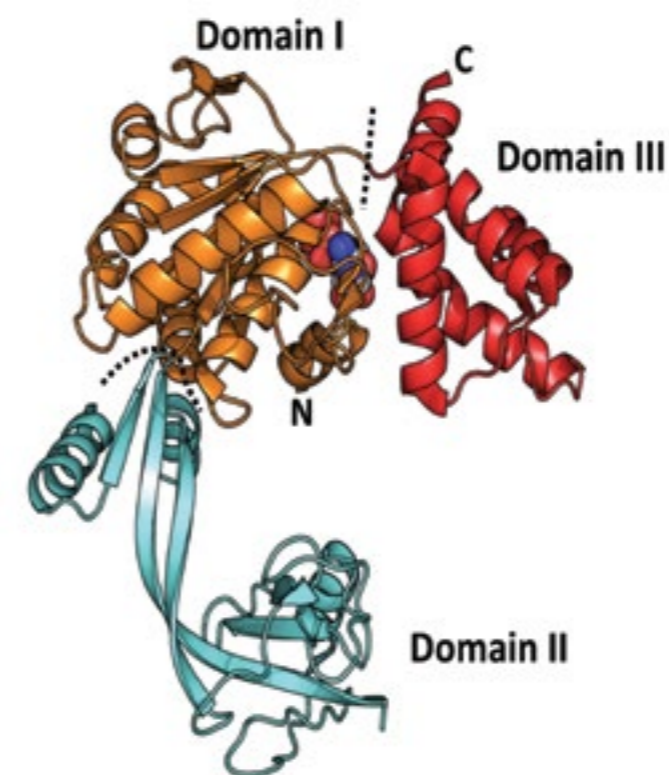
Structural biology of enzymes (Carlos Frazão)

3D structural studies of native sulfur oxygenase reductase in complex with inhibitors and of key-point enzyme mutations, in order to elucidate the reaction mechanism of sulfur disproportionation in this proteic self-compartmentalising nano-reactor.



Sulfur Oxygenase Reductase

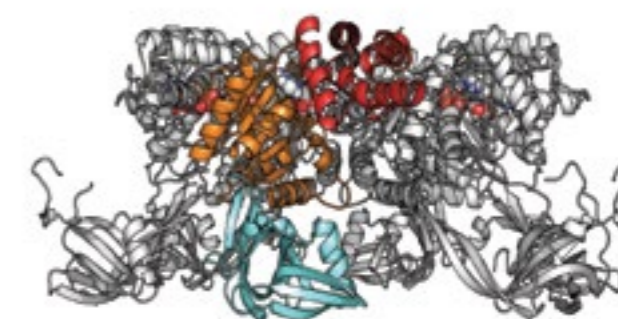
A self-compartmentalising nano-reactor for sulfur disproportionation



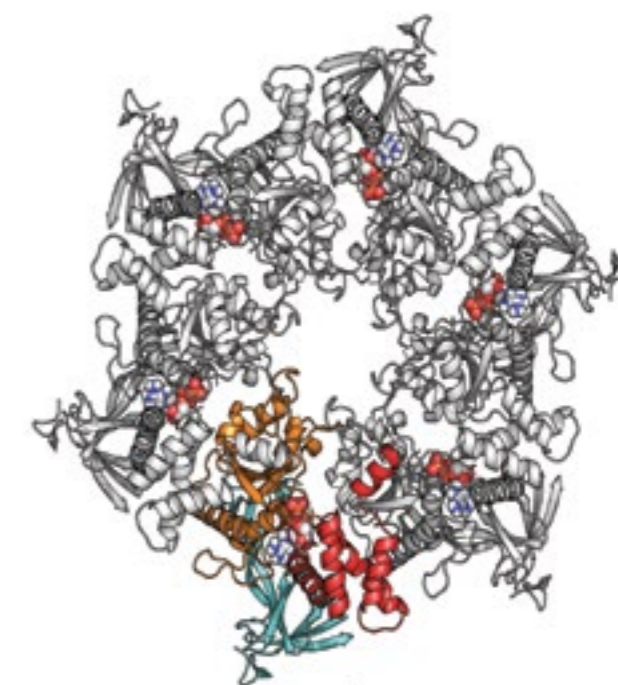
The monomer

Human RuvBL1

The hexamer



side view



top view



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INSTRUMENTAÇÃO E FÍSICA
EXPERIMENTAL DE PARTÍCULAS

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RESEARCH INSTITUTION IS USER
AND HAS COLLABORATION(S) WITH:

► **CERN**

ESO
ESRF
ITER

TECHNOLOGY DOMAIN

- SOFTWARE
- HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Experimental High Energy and Particle Physics
- ▼ Experimental Astroparticle Physics
- ▼ Detectors and Instrumentation
- ▼ Distributed and GRID Computing

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

LIP is a scientific and technical association of public utility that has for goal the research in the fields of Experimental High Energy Physics and Associated Instrumentation.

LIP's research domains include Experimental High Energy Physics and Astroparticles, radiation detection instrumentation, data acquisition and data processing, advanced computing, and applications to other fields, in particular Medical Physics.

LIP is an "associated laboratory" assessed as "Excellent" by international panels, and hosts in its three sites at Coimbra, Lisbon and Minho, nearly 200 people (85 with a Ph.D.).

FIELDS OF EXPERTISE

Particle and Astroparticle Physics – CERN

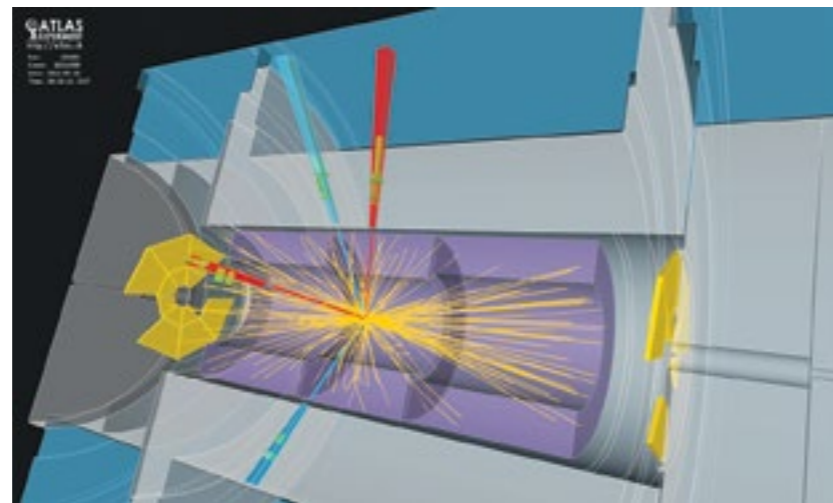
LIP participates in the ATLAS, CMS and COMPASS experiments at CERN, with high responsibilities in several physics analyses teams and detector projects, committed to the exploitation of the full potential of the LHC. LIP participates also in experiments ranging from direct searches for dark matter (LUX) and neutrinoless double beta decays (SNO+), to the detailed study of high-energy cosmic-rays (Auger and AMS).

R&D in Detectors – CERN

LIP has a strong R&D in detectors for the upgrades of the experiments and a generic R&D in novel detection techniques is also being vigorously pursued.

GRID Computing, Technology Transfer, Outreach, Education and Training – CERN

LIP has also a strong involvement in GRID computing, technology transfer, outreach and education addressed to schools and developing countries, and training of the new scientists of tomorrow.



MAIN R&D PROJECTS AND SERVICES

Upgrades of Experiments – CERN

LIP has precise R&D plans for the upgrade of the LHC experiments (scintillating fibres, precise timing detectors, microelectronic circuits, high speed optical links), for the upgrade of the Auger detectors (RPC muon detectors), and for the upgrade of the LUX (Liquid Xenon detectors) experiments.

GRID Computing – CERN

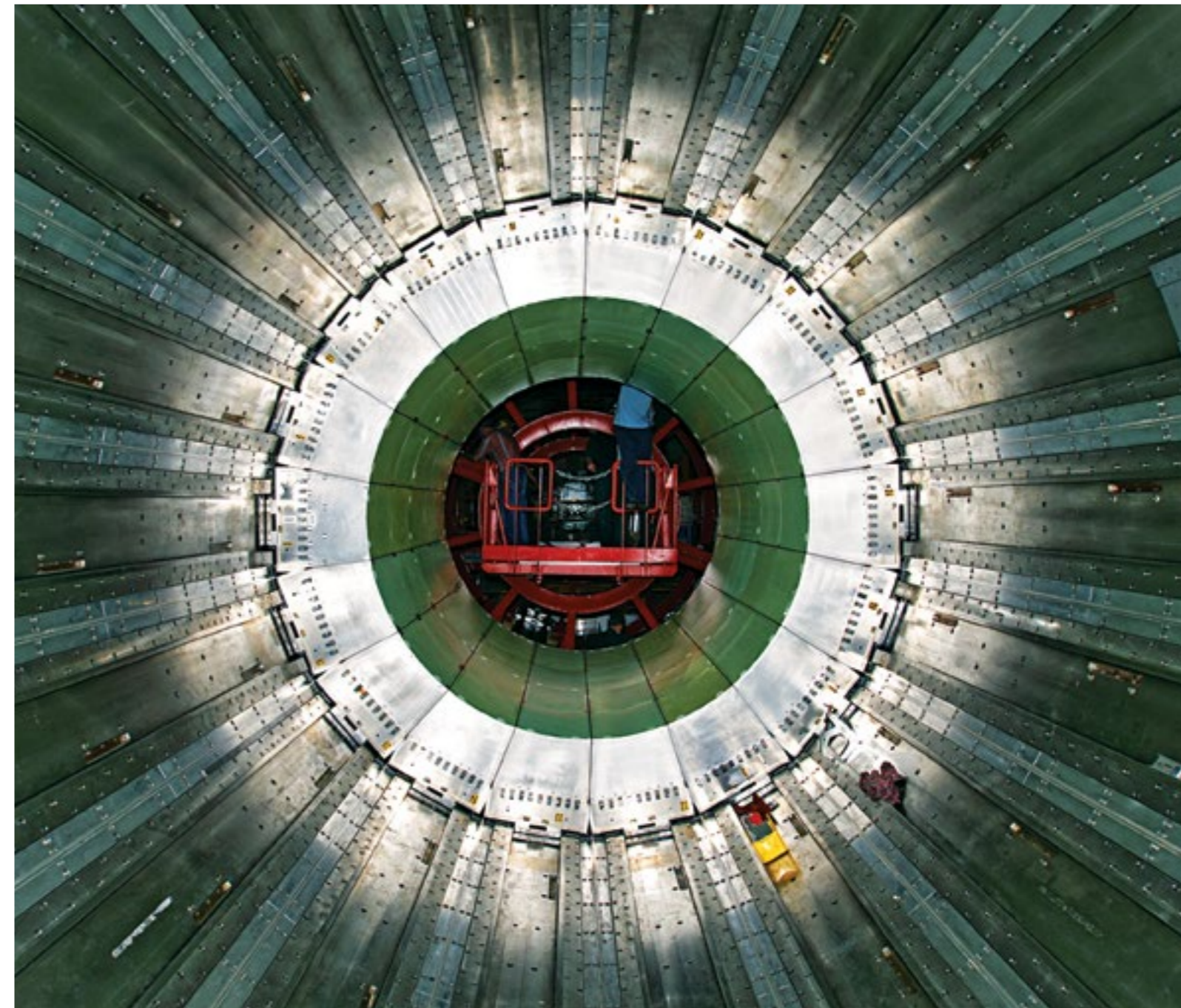
In advanced computing LIP has the strategic mission of operating the Portuguese component of the Worldwide LHC Computing Grid. LIP plays a central role in the new national GRID structure and in EGI and is also an active participant of EU Framework Programmes for R&D in this area.

Technology Transfer – CERN

LIP has a long record of technology transfer, in particular medical applications (Detectors and Methods for Biomedical Applications), space studies and instrumentation (Radiation Environment Studies and Applications for Space Missions at ESA). LIP is also committed to facilitate access of the Portuguese industry to CERN, and the technological transfer from CERN and ESA to Portuguese companies.

Outreach, education and training – CERN

LIP has developed a strong programme in outreach and education, in particular with the Masterclasses in Particle Physics and the Portuguese Language Teachers Programmes at CERN. LIP also has launched and coordinates an international doctorate network (IDPASC), which aims at training the scientists of tomorrow.





LABORATÓRIO NACIONAL DE ENERGIA E GEOLOGIA, I.P. - UNIDADE DE RECURSOS MINERAIS E GEOFÍSICA

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RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

- CERN
- ESO
- ▶ ESRF
- ITER

TECHNOLOGY DOMAIN

- ▶ SOFTWARE
- HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Element speciation
- ▼ Materials characterization
- ▼ Mineral resources

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

The Portuguese National Laboratory for Energy and Geology (LNEG) is a State laboratory of the Ministry of Environment, Spatial Planning and Energy that makes R&D oriented to the needs of society and enterprises, investing in a sustainable research, along with the international best practices, ensures that its areas of expertise allow an adequate response to the needs of the business sector.

LNEG's mission is to promote technological innovation science and technology oriented for economic development contributing to increase competitiveness of economic agents in the context of sustainable progress of the portuguese economy.

FIELDS OF EXPERTISE

Spectroscopy.

Element speciation through XANES, EXAFS at the ESRF.

MAIN R&D PROJECTS AND SERVICES

"Towards a sustainable recovery of critical metal resources: a XAFS study of W and Re L1- and L3-edges in tailing materials from the Panasqueira tungsten mine" (ESRF, Reference ES-128, beam-line BM-25A, July 2014).

"Selenium in wastes from the old mine of S. Domingos in southern Portugal (IPB): retained in relics of former ore chalcogenide minerals or already attached to oxygen?" (ESRF, Reference EV-13, beam-line BM-25A, June 2013).

"The binding state of rhenium in its natural carrier, molybdenite: a XANES study through the L-edges" (ESRF, Reference CH-3421, beam-line BM-23, September 2011).





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**RESEARCH INSTITUTION IS USER
AND HAS COLLABORATION(S) WITH:**

CERN
ESO
▶ ESRF
ITER

TECHNOLOGY DOMAIN

▶ SOFTWARE
▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

▼ Structural biology
▼ Macromolecular X-ray crystallography
▼ Small-angle X-ray scattering SAXS
▼ Drug design

OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

The Faculty of Sciences and Technology (FCT) is one of the nine academic units of Universidade Nova de Lisboa (UNL).

Founded in 1977, FCT/UNL is one of the most prestigious Portuguese public schools of science and engineering today, with a total enrollment of ca. 7500 students, of which nearly 1400 are postgraduate students (MSc and PhD).

FCT/UNL hosts 16 research centres acknowledged by Fundação para a Ciência e a Tecnologia (of which 3 are rated "excellent" and 6 "very good"), as well as 2 Poles of research centres (both rated "very good").

FIELDS OF EXPERTISE

ESRF

The Macromolecular Crystallography Group at FCT-UNL has been benefiting from the several technologies provided by ESRF, since 1997, when Portugal joined as a Scientific Associate Member of the ESRF. In 2013, this membership was renewed for another 5 years.

The main fields of expertise used are available at the Macromolecular Crystallography beamlines, and comply:

1- X-ray diffraction and fluorescence

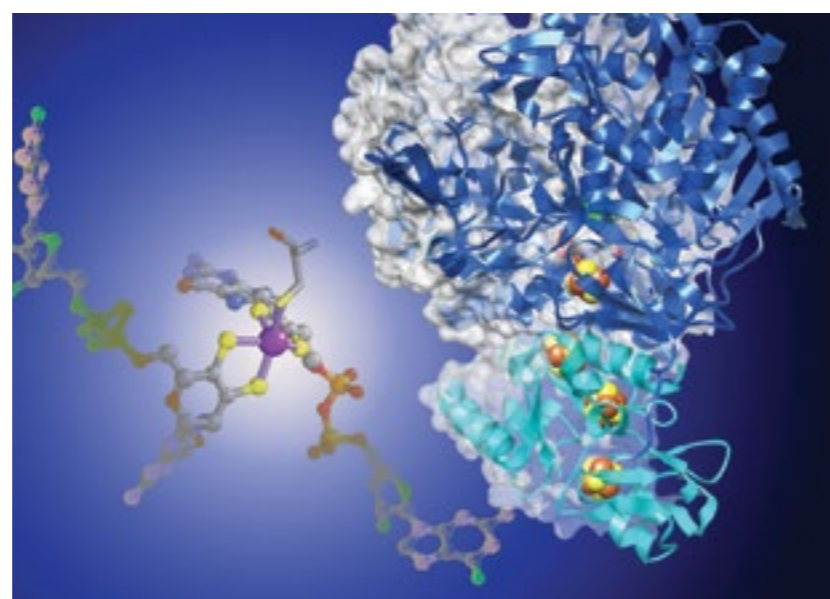
Protein crystals are produced in home labs and shipped to the ESRF for X-ray diffraction and fluorescence experiments with the main goal of determining the atomic three-dimensional structure of the proteins under study.

2- small-angle X-ray scattering (SAXS)

This expertise uses X-rays scattering from proteins in solution to find the overall shape of these proteins (low resolution), isolated or in complex.

3- microspectrophotometry

The redox state of proteins can be monitored during exposure of samples to X-rays.



MAIN R&D PROJECTS AND SERVICES

ESRF

In FCT-NOVA, we use the data provided by ESRF to study protein samples using X-ray Crystallography methods. Our main projects involve:

1. Mechanistic studies and identification of ligands, at atomic level

We have a strong, internationally recognized, expertise in the structural studies of enzymes, like nitrate reductases and aldehyde oxidases from different organisms, and data obtained at ESRF have helped clarifying the details of several enzymatic mechanisms.

2. Drug design and ligand discovery

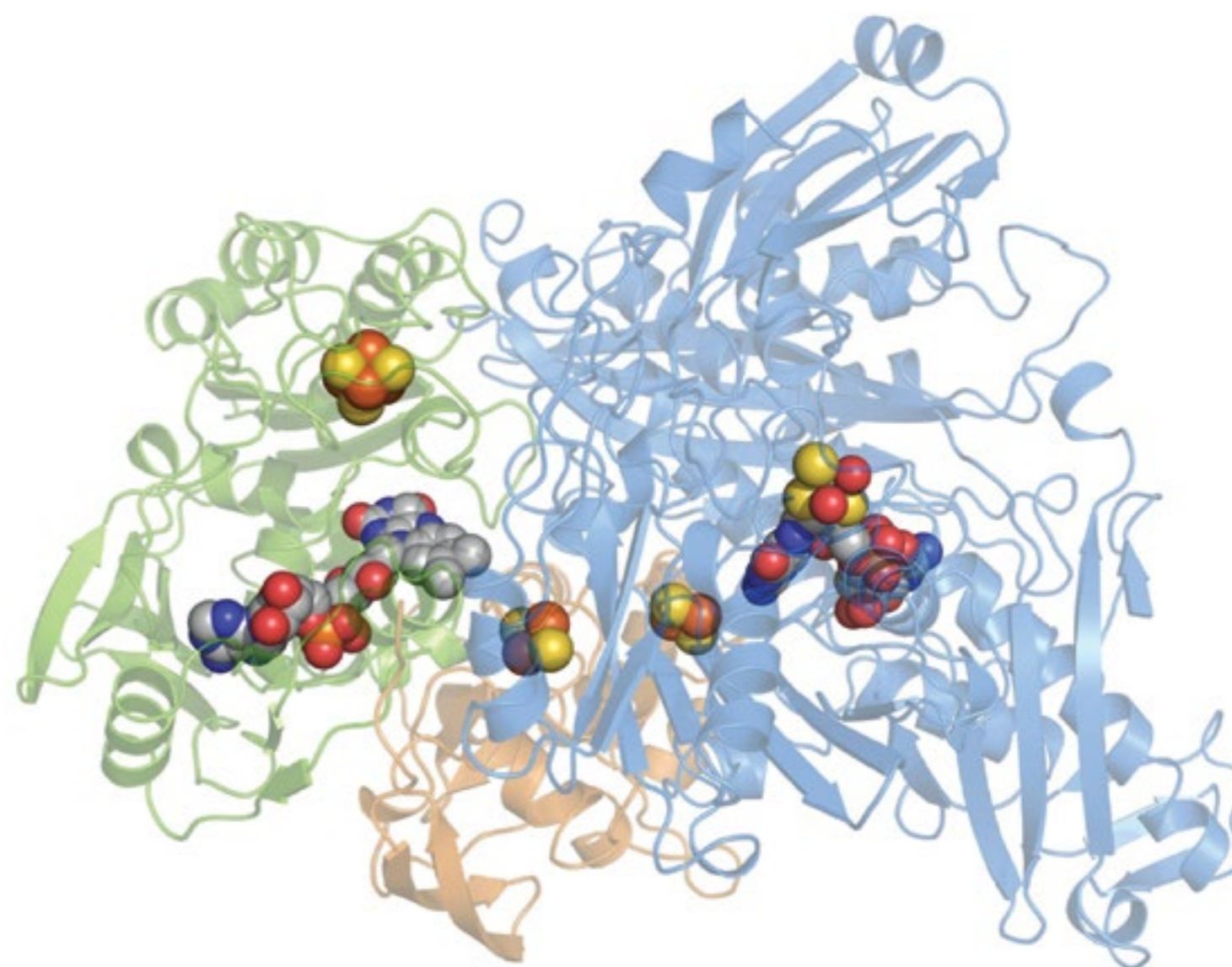
We use several blood plasma proteins to study the recognition (at atomic level) and/or transport of candidate drugs to treat many diseases. ESRF data has allowed to "view" at an atomic level the protein-drug interactions.

3. Glycan-protein and protein-protein interactions

We have used ESRF access and data to study big molecular assemblies that function like nanomachines. X-ray diffraction and SAXS data has been crucial to characterize protein modular systems, like cellulosomes. Furthermore, glycans are molecules involved in many recognition and communication processes at the cellular and molecular levels and ESRF data can provide information to "view" molecular interactions with atomic detail, which is helpful to understand how different molecules behave and recognize partners in the cellular environment.

4. Novel approaches to protein crystallization using nanoparticles and ionic liquids

ESRF data has been crucial in assessing the effects of innovative agents in crystal growth.





SIM
- LABORATÓRIO DE SISTEMAS,
INSTRUMENTAÇÃO E
MODELAÇÃO EM CIÊNCIAS E
TECNOLOGIAS DO AMBIENTE E
DO ESPAÇO

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OVERVIEW AND GENERAL DESCRIPTION OF THE RESEARCH INSTITUTION

The SIM laboratory is a Research Unit of the Faculty of Sciences University of Lisbon (FCUL) with a pole at Porto University School of Engineering. Expertise at SIM stems from several years of forefront academic research and industrial R&D ranging from Particle Physics (CERN, DESY), development of leading edge infrared astronomical instrumentation (ESO), image and interferometry analysis (ESO, ESA) as well as industrial development for satellites and their ground segments (ESA).

The SIM CERN/ESO team will join the CENTRA (Multidisciplinary Centre for Astrophysics) research unit in January 2015.

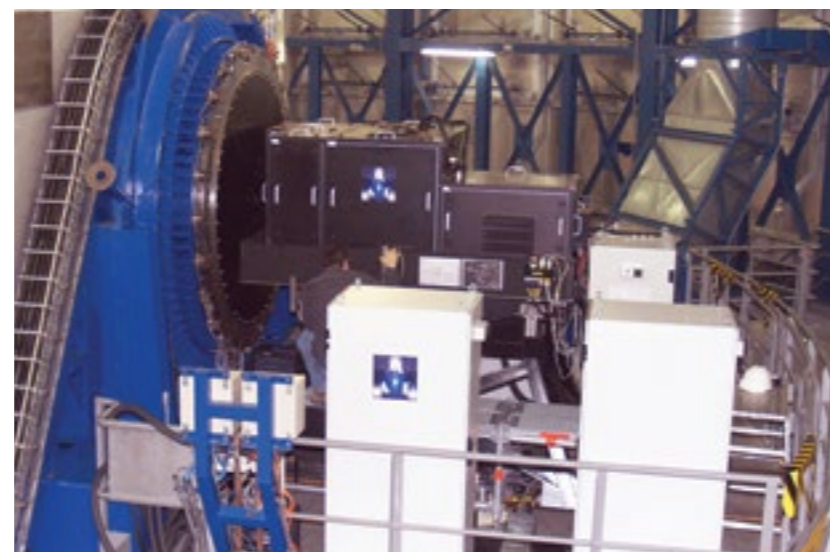
FIELDS OF EXPERTISE

Instrumentation (ESO/CERN)

Expertise in optical (visible and infrared) imaging systems and wavefront analysis, in cryogenics and vacuum for ESO. Project stages of conceptual design, opto-mechanical design, system integration, validation and testing are covered. Expertise on CERN instruments data acquisition, including overall data acquisition, monitoring and analysis support systems.

Data Processing & Analysis (ESO)

Data reduction and signal processing for photometry, astrometry, adaptive optics, optical interferometry and integral field spectroscopy. Advanced data reduction using Bayesian techniques, inverse problems and parallel computing, 3D visualization (including stereoscopy) of scientific large-scale multidimensional databases. Project stages of requirements, specifications, design, implementation and testing. ESO standards software development. Virtual observatory standards.



MAIN R&D PROJECTS AND SERVICES

CAMCAO (ESO)

CAMCAO is the imaging camera of MAD, an ESO Multi-conjugate adaptive optics system. It is a cryogenic camera operating in the near-infrared (1-2 microns). The mechanical design, opto-mechanic integration and testing was developed by the team.

GRAVITY (ESO)

The acquisition camera of the GRAVITY instrument is a near-infrared cryogenic camera. Further to the imaging capability it does simultaneous beam analysis (wave-front sensing, pupil displacement sensing) for four telescopes. The camera was fully developed by the team (from conceptual design to integration). The team also developed the data reduction pipeline using ESO software standards.

OPTICON (ESO)

SIM coordinates the Portuguese participation in OPTICON, an FP7 European-wide network of optical-infrared infrastructures (including ESO), instrument builders and R&D institutes. The participation scope is on R&D in optical interferometry and adaptive optics signal processing, we also lead the European-wide coordination of optical interferometry work-package.

ATLAS and CLOUD (CERN)

The group has a long been involved in the development of data acquisition for large physics experiments including ATLAS/CERN and HERA-B/DESY where we had an important role in the development of the information systems.

We are presently responsible for the overall data acquisition, monitoring and analysis support systems CLOUD/CERN experiment.



RESEARCH INSTITUTION IS USER AND HAS COLLABORATION(S) WITH:

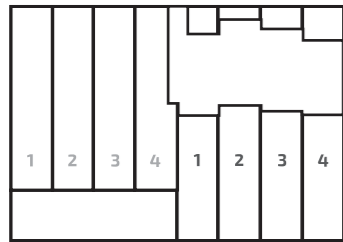
- ▶ CERN
- ▶ ESO
- ESRF
- ITER

TECHNOLOGY DOMAIN

- ▶ SOFTWARE
- ▶ HARDWARE

TECHNOLOGY SUB-DOMAIN

- ▼ Astronomy and Astrophysics
- ▼ Instrumentation: mechanics, cryogenics, optics, electronics
- ▼ Scientific computing, data acquisition, databases



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ABOUT THE CONTENTS

Some of the descriptions for each company and research institution in "Fields of Expertise" and "Main products and Services" are specific to the supplies/services and collaborations with the respective large scale research infrastructures and may not showcase the complete portfolio of the company or research institution.

For further information please follow the link to the website.

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