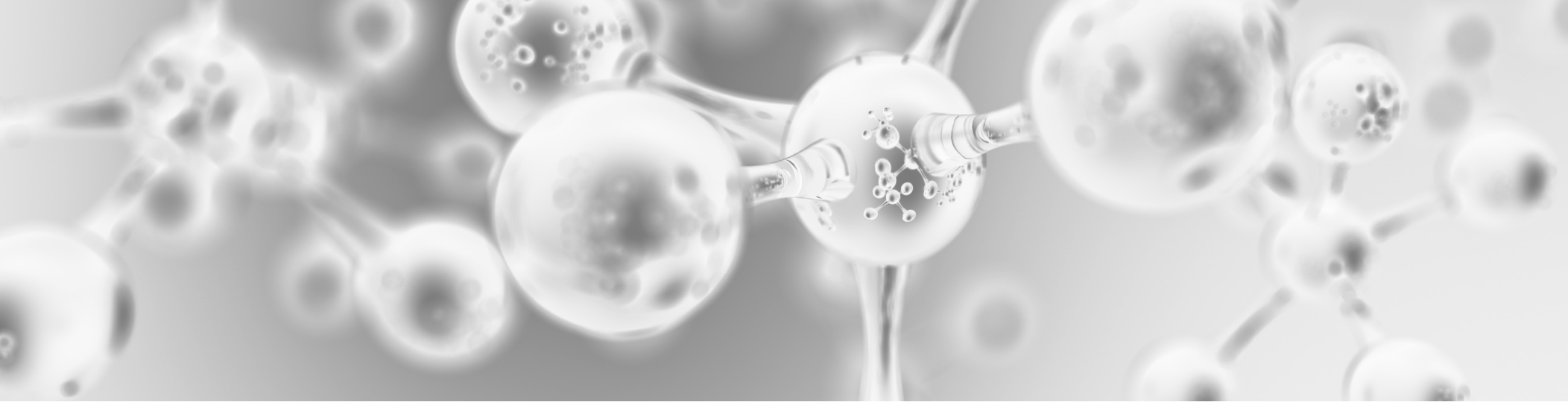


ESS - BILBAO. THE SPANISH CONTRIBUTION TO EUROPEAN RESEARCH EXCELLENCE

ESS bilbao

newsletter

SEPTEMBER 2021

Courtesy of ESS

summary

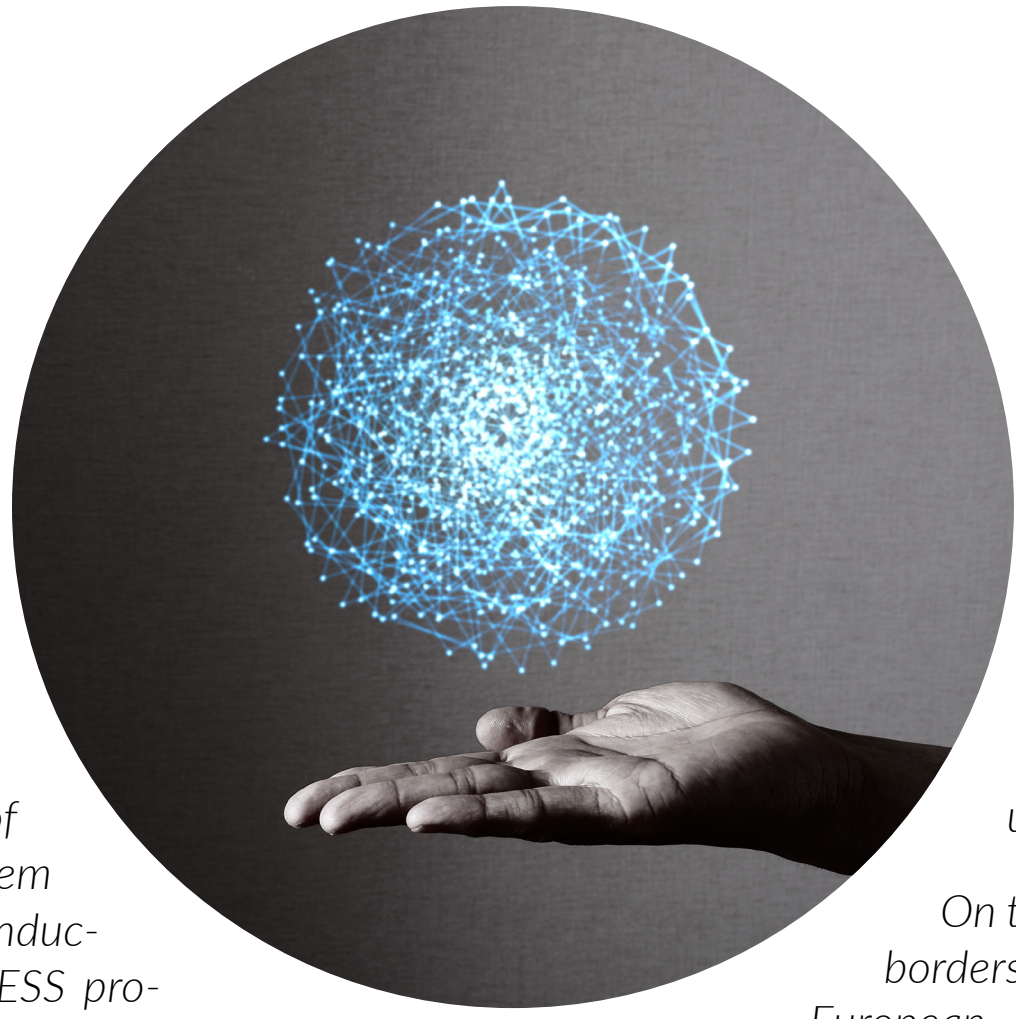
MARIO PÉREZ
Executive Director

Working tirelessly to meet our goals

The first six months of the year have passed so fast! Here we are slightly past the mid-year point after a deserved holiday break. All the ESS Bilbao team is now resuming work with passion and optimism. I hope this time has been good for you and your loved ones as well.

In several parts of the world, the COVID crisis is still wreaking havoc on families, communities, and organizations. For those of you who are living in a country still fighting hard to get or maintain control over the pandemic, our thoughts are with you and we hope things will improve soon. Fortunately, in a number of other countries including Spain, vaccination campaigns are starting to pay off and people are starting to be able to meet in person again. Some are even starting to be able to travel again. In the meantime, I wanted to update you on what we've been up to over the last six months from our previous newsletter issue.

First and foremost, we keep on delivering on our commitments towards the European Spallation Source (ESS). After years of work, ESS Bilbao



successfully completed the delivery of the whole RF system for the Normal Conduction section of the ESS proton LINAc. We also made progress in many of the Target Systems under our responsibility, including the Proton Beam Window (PBW), Proton Beam Instrumentation Plug, PBW Port-Block and Vessel.

Beyond this, the FAT tests for the Drive Unit were successfully conducted at AVS. Vacuum tests for the Shaft and Connection Pipe were carried out at Thuneureka as well. The Cassettes (spallation material + stainless steel structure) have already been assembled in the Target Wheel and the window welding process started at Nortemecanica. Later this year, an ESS Bilbao team will be carrying out the integrated tests on all these components, which make up the system at the core of the ESS Machine.

On this occasion, we wished to highlight our efforts as well to start the implementation of an advance management system based upon the well-known framework from Euskalit. This goes hand in hand with the definition of our Strategic Plan for the upcoming years.

On the latest news beyond borders, we present you the European Low-Energy Accelerator based Neutron facilities Association (ELENA). ELENA is a not-for-profit association formed to promote cooperation between European laboratories, companies and researchers working in the field of low energy accelerator based neutron sources.

Finally, we close this issue with an article on Ikerbasque (Basque Foundation for Science), an organization promoted by the Basque Government to strengthen science in the Basque Country through talent attraction programs, which has delivered extraordinary success on its goals over the past 14 years since its creation.

I hope that we are managing to stay in touch with you in a meaningful way for you. We hope that you will take time to connect with us, and that we will be able to meet you again soon, in person or on a screen, if and when possible.

Until then I wish you all the best!!!

Huge challenge for ESS Bilbao, the RF Systems are on site

Courtesy of ESS

Eight years ago, a team of almost 15 researchers from ESS Bilbao made the commitment and accepted the challenge to take over the design, manufacturing and commissioning of all the RF systems for the Normal Conducting section of the European Spallation Source (ESS) proton LINAC. During all these years, there have been many difficulties that they have had to face but in the end the effort and work of the whole team in coordination with the industrial partners in Spain has made it possible and most of the RF equipment is already installed at the ESS site in Lund, Sweden. This work has been co-funded by European Regional Development Funds under the FEDER TRACKS project (Transmisores de RF para Aceleradores basados en Klystrons y Estado Sólido).

The ESS project is the world's most powerful pulsed neutron source based on a linear accelerator or linac, which accelerates a proton beam of 62.5 mA current to an energy peak of 2000 MeV. This includes a superconducting linac, preceded by a normal conducting section composed of an Ion Source, an RFQ (Radio Frequency Quadrupole), an MEBT (Medium Energy Beam Transport, also an ESS Bilbao contribution) with three bun-

> *"I'm very proud of the team that has been involved in this challenging project. Thanks to all efforts and commitments, we have delivered a key part of the European Spallation Source. The installation and commissioning of the RF stations are already a reality*

Pedro González,
Technological Director and RF System work package leader at ESS Bilbao.

cher cavities, and a DTL (Drift Tube Linac) consisting of 5 tanks.

The normal conducting linac will be powered by nine RF power sources operating at 352.21 MHz.

The RF system can be defined as all the components and subsystems needed to generate and deliver RF power to the cavities between the wall power plug (AC power from the grid) and the cavity power coupler (at the cavity input). The complete chain includes pulsed high voltage sources (or modulators), high power amplifiers, waveguide or coaxial RF distribution systems and Low Level RF control systems (LLRF).

ESS Bilbao's tasks included the design and prototyping, procurement, integration, factory testing, transportation, delivery and finally the supervision of the installation and assistance with the commissioning of the RF stations at the ESS site in Lund (Sweden).

The integration of the RF power stations was successfully carried out by the team headed by Morten Jensen.

RF TEST STAND

Soon, ESS Bilbao undertook the development and commissioning of a High-Power RF Test Stand (RFTS).

RF SYSTEM SCOPE

- **Generate the required RF power to properly accelerate the charged particle beam inside the cavities.**
- **Maintain the amplitude and phase stability of the accelerating field within a given tight tolerance to accelerate the particles with minimum degradation of beam quality.**
- **Protect the machine itself from any failure.**


Courtesy of ESS

Co-funded by European Regional Development Funds under the FEDER TRACKS project (Transmisores de RF para Aceleradores basados en Klystrons y Estado Sólido)

The RFTS comprises a complete RF transmitter chain of up to 3 MW at 352 MHz, much like the ones for the ESS LINAC. That includes a modulator, a klystron with all its ancillaries and waveguide components. Besides, a large deionized water-cooling system is required, as well as low-level RF generation and distribution and specialized RF measurement equipment. The RFTS is installed inside a fence enclosure (to avoid electric, non-ionizing and ionizing radiation risks), and it is fully operated from a control room.

The RFTS has been instrumental in testing and validating high power klystrons, several types of waveguide components and the buncher cavities and their power couplers. Eventually, it will serve as the RF power source for the ESS Bilbao RFQ currently under construction.

MODULATORS

The pulsed high voltage power converters, also known as modulators, energize the klystrons for the ESS LINAC's RFQ and DTL tanks. A total amount of 3 modulators is required for 6 klystrons, i.e.: each modulator powers two klystrons in parallel. These modulators are based on an advanced topology developed by the team led by Carlos Martins at ESS ERIC with the help of Lund University, known as Stacked Multi-Level (SML). This topology is able to provide high quality pulses, outstanding efficiency and low flicker, while exhibiting high power density in a relatively reduced footprint.

ESS Bilbao took over the responsibility to procure the first 3 modulators, based on a "built-to-print" strategy, where ESS ERIC provided a complete design dossier. The contract was awarded to Jema Energy, S.A., a Basque company specialized in the design and manufacturing of turnkey energy conversion systems. Jema Energy, a lifelong partner of ESS Bilbao, undertook the industrialization of the design and the manufacturing and factory tests of the three modulators.

The in-kind contribution was executed on the basis of a joint collaboration between the parties (ESS ERIC, ESS Bilbao and the industrial partner), with shared responsibilities and due regard to the prime interests of the ESS project overall.

It is worth mentioning that JEMA Energy was afterwards awarded two new contracts from ESS ERIC for the manufacture of 9 and 5 additional modulators for the superconducting sections of the ESS LINAC.

KLYSTRONS

ESS Bilbao is also in charge of the delivery of the power klystrons for the RFQ and DTL tanks. Klystrons are vacuum electron devices (or "tubes") able to provide huge amounts of RF power.

Six pulsed klystrons featuring up to 3 MW peak at 352.21 MHz are required. Three of them have recently been acquired from Thales Microwave and Imaging Sub-Systems and delivered to the ESS site.

At the same time, three existing klystrons (procured by ESS Bilbao in 2010 from Communications and Power Industries, or CPI, Inc.) have been refurbished following a lengthy reconditioning procedure to accommodate the tubes for the ESS long-pulse operation. As such longer pulses might create increased mechanical stress in the collector parts, a thorough conditioning procedure was performed to progressively and safely enlarge the pulse length until the nominal operating conditions were achieved.

SSPAS

As opposed to RFQ and DTL, buncher cavities require medium power amplifiers (with "only" 30 kW peaks). These power levels (and increasingly higher ones) can be provided by Solid State Power Amplifiers (SSPAs), based on LDMOS FET transistors. These offer some ad-

vantages over the tubes, as no high voltage is required (SSPAs are powered directly from an AC grid), no X rays are produced, no vacuum provisions are needed, and modularity enables better reliability and fault-tolerance, easier maintenance procedures and, all in all, a longer lifetime.

The contract to develop and manufacture 3 SSPAs for the buncher cavities was awarded to Broad Telecom S.A. (BTESA).

RF DISTRIBUTION - WAVEGUIDES

RF distribution networks carry the RF power from the amplifiers in the RF gallery up to the accelerating cavities inside the tunnel, which are located some 40 meters apart. RFQ and DTL RF power stations use large rectangular waveguides (roughly 60 cm wide hollow tubes).

Not only straight sections and bends are needed, but also flexible sections, power splitters, phase shifters, directional couplers, shutter switches, adapters and mechanical supports. The waveguide layout was routed by ESS ERIC and ESS Bilbao, to connect the RF power sources and the cavities, while guaranteeing exact phase matching between each pair of couplers. Then, most of the waveguide components have been developed, produced, and delivered by Spanish companies such as Rymsa RF-Sener Aerospacial and AWGE Technologies S.L., as well as the American company Mega Industries.

The construction of high-power circulators and loads was awarded to AFT Microwave GmbH. The main challenge related to the design of waveguide components is the high electric field which can cause arcing and eventually damage on the surfaces. So, provisions of arc detection were also installed to quickly turn off RF in case of arcs.

LLRF

The Low-Level RF control system (LLRF) is responsible for maintaining the accelerating field quality (in terms of amplitude and phase stability). That is accomplished by an advanced fast digital feedback loop which samples the field inside the cavity and adjusts the RF signal applied to the amplifiers. Besides, control of cavity resonant frequency is provided. These functions are key to an adequate acceleration with minimum beam quality degradation.

The ESS LLRF system is based on the MTCA.4 platform (Micro Telecommunications Computing Architecture for Physics). This allows a modular design, consisting of some standardized cards from different vendors, with high availability arising from redundant power supplies and fan trays, as well as hot swappable cards.

The LLRF system was developed by Lund University and ESS ERIC. ESS Bilbao, as well as the Polish Electronic Group also contributed with some subsystems such as the local oscillator and clock generation and distribution, the master reference, etc. These extremely low noise local oscillator and clock subsystems are needed to provide clean references for frequency down/up conversion, digitizing RF signals and signal processing in the FPGA.

ESS Bilbao has integrated and tested 35 LLRF systems intended for the RFQ, MEBT, DTL and spoke sections of the ESS LINAC. Besides, the company Seven Solutions S.L. has industrialized and manufactured the LO and clock generators and distribution for these LLRF systems.

BUNCHER CAVITIES

The MEBT (Medium Energy Beam Transport) is the LINAC section that matches the RFQ output beam characteristics to the DTL input. This section consists of quadrupole magnets, RF buncher cavities, a set of beam diagnostics and a fast chopper.

The three buncher cavities, along with their power couplers, have been RF conditioned at ESS Bilbao's premises. This process involved a progressive increase of pulse length, repetition rate and power until the nominal operating conditions were reached, while maintaining high vacuum levels. Completion of that process for the cavities meant a huge milestone for ESS Bilbao, in terms of validating the design, reducing risks and shortening commissioning time at ESS.

COMPLEX SPANISH ENGINEERING FOR THE CORE MACHINE OF ESS

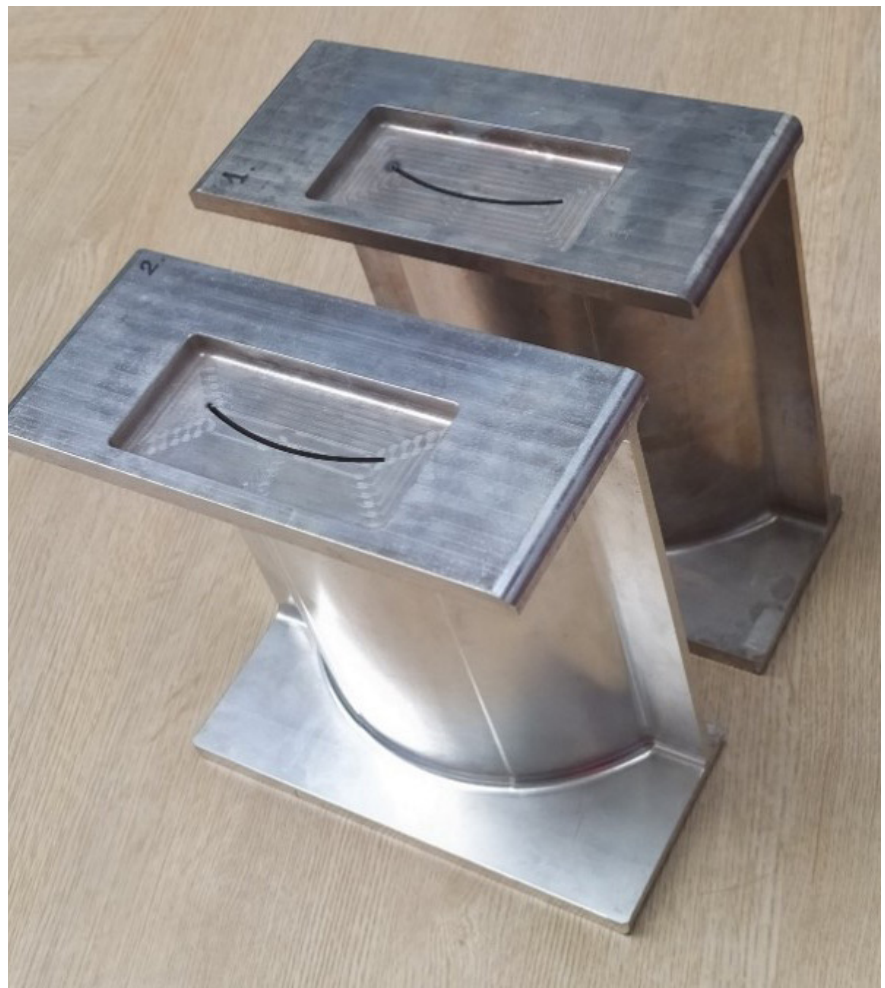
ESS Bilbao is one of the main partners responsible for the design, manufacturing and commissioning of the key components included at the ESS Target Station, the core of the ESS infrastructure, the place where neutrons are created. These components have a direct impact on the number of neutrons that can be generated and are therefore of the utmost importance for the future scientific capabilities of ESS. They require electrical and instrumentation design and development to meet power, grounding, cable routing, monitoring, and controls requirements.

ESS Bilbao Target Group, led by **Raúl Vivanco as Project Manager** is developing different work packages.

1 PROTON BEAM WINDOW

PBW is the component that separates and confines the accelerator and target atmospheres in the 5MW proton beam path, evacuating the high energy released by it as a result of the nuclear interaction. The component consists of two 1mm 6061-T6 aluminium plates separated by a cylindrical 2mm channel. The added value of this system consists in cooling around 5kW deposited by the proton beam while maintaining a temperature on the plates below 55°C.

Because Al6061 is a difficult material to weld, and due to the high manufacturing tolerances, to guarantee optimal manufacturing conditions, the PBW is designed avoiding any welding. The manufacturing process com-



Proton Beam Window

bines EDM, WEDM and milling. Multiple sets of prototypes of the PBW have been made, until the design and manufacturing have proven their feasibility.

Due to the high levels of irradiation, it is necessary to replace the PBW every 6 months of operation. For this reason, it has been necessary to design a remote deployment and extraction system and pneumatic sealing of the two atmospheres. The PBW incorporates two vacuum seals that are activated remotely. Through a combined system of bellows and pressure membranes, together with vacuum grooves, it is possible to achieve leakage rates lower than 2E-5 mbar-l/s.

Remote operation and feeding of the system

To protect from high radiation dose rates, a 17t shielding fills the empty volume used for the installation. The cooling system will consist of two independent loops that are introduced at 4 meters and are channelled through the shielding in the shape of a helix that minimizes the dose levels emitted by the PBW. Together with the refrigeration system, the pressure and vacuum systems are routed to activate the remote seals.

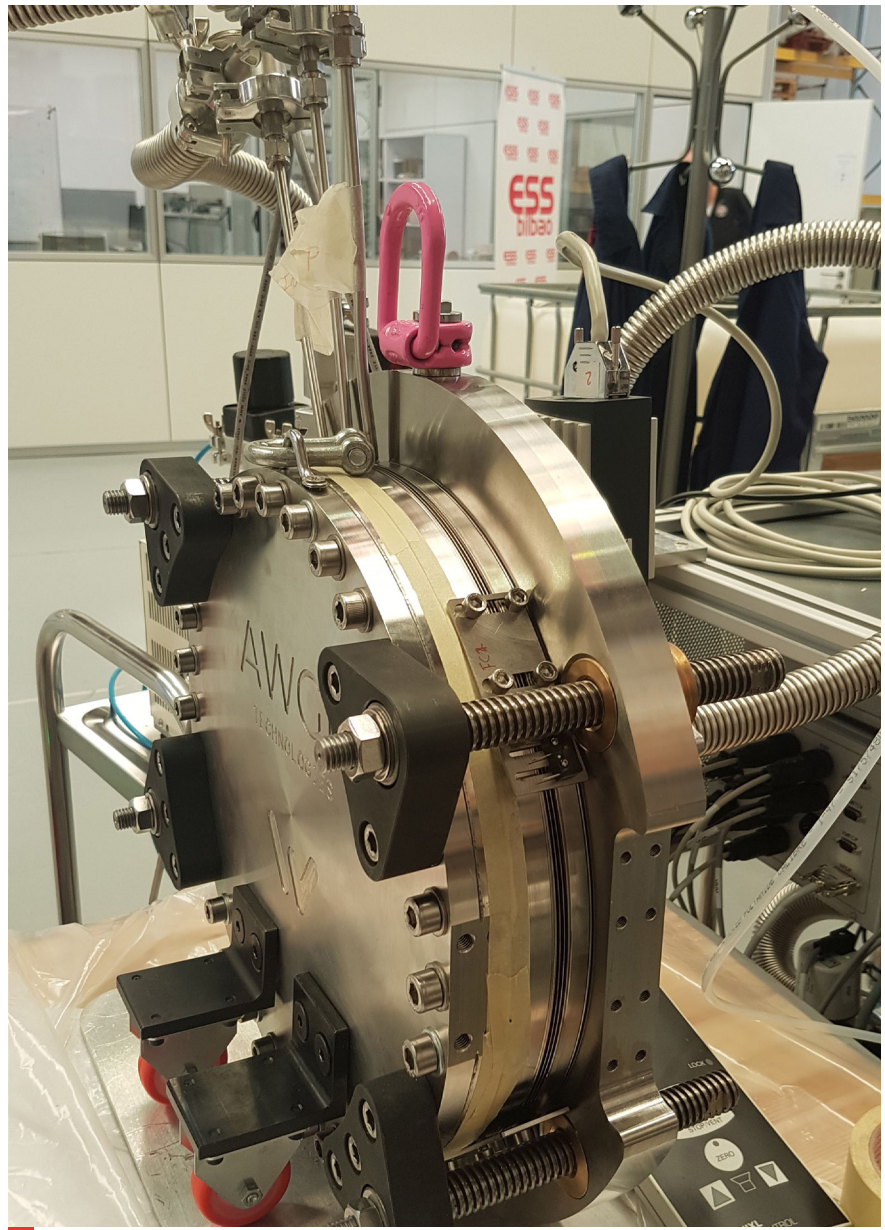
Mechanical design of the PBI

"ESS Bilbao has been awarded a contract to perform the thermomechanical design for the PBI (Proton Beam Instrumentation) to be installed in the PBW. In this way, we hope to help the other stakeholders to finish defining their interfaces with our component; while we manage to make visible the technical capabilities of our design team", says Raúl Vivanco, Project Maganer at ESS Bilbao.

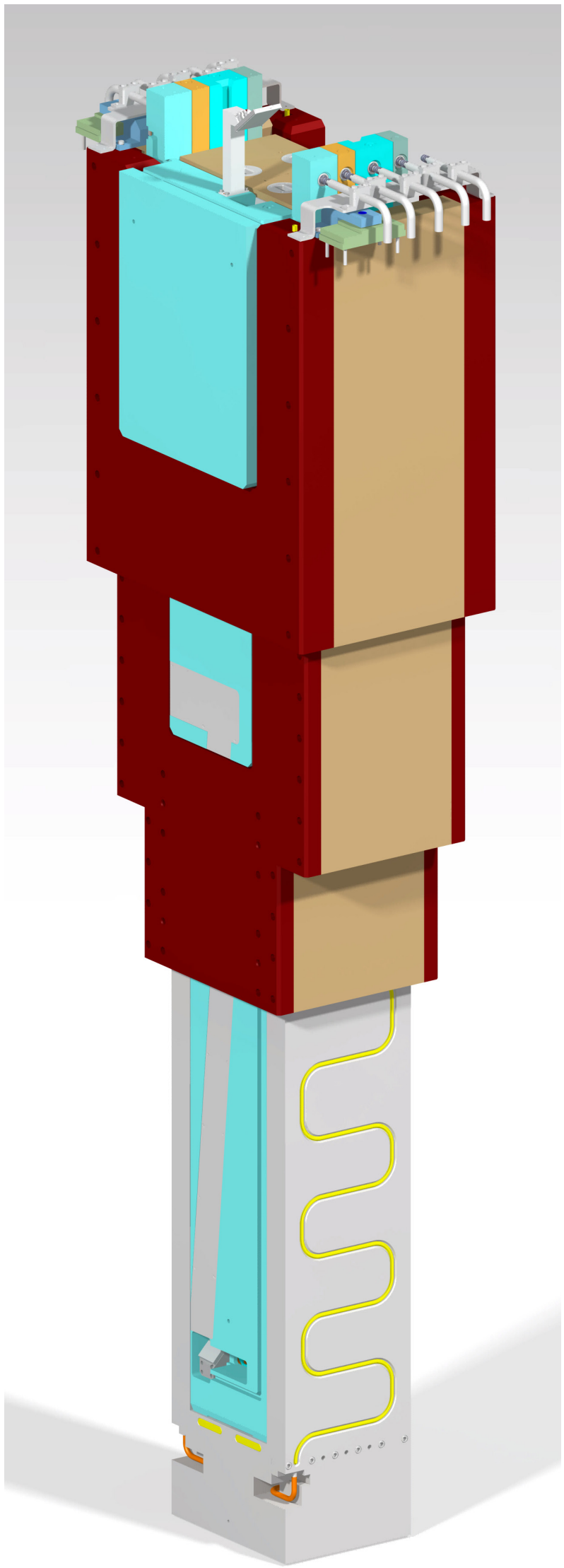
Likewise, tests are being carried out in the Advance Welding Facility that ESS Bilbao has in Júndiz to validate a welding procedure in Al6061 using EBW (Electron Beam Welding).

The ESS Bilbao Target Group, led by Raúl Vivanco as Project Manager is developing the different work packages.

Termomechanical camera



PBW vacuum seals remotely actionable



PBIP CAD model

2 PROTON BEAM INSTRUMENTATION PLUG

The PBIP (Proton Beam Instrumentation Plug) project consists of the design and manufacture of the support, positioning, wiring, and cooling system for the Target instrumentation.

It is coming to the end of its design phase, with the Remote Handling system and PBI interfaces currently under development. ESS Bilbao has expressed its willingness to ESS to also carry out the thermomechanical design of the PBI interface with the PBIP, in the same way as the PBW; which would mean a new contract for ESS Bilbao.

3 PBW-PORT BLOCK VESSEL

This project consists of the design and manufacture of the two pressure vessels that house the PBW; and the refrigerated tube that connects to the Monolith Vessel. Its function is to allow the positioning of the PBW within tolerances of +-0.5mm, as well as to serve as the first confinement barrier in the event of a leak from the target to the accelerator due to a possible failure of the PBW. Its complexity lies in the multiple interfaces with the PBI, Remote Handling, PBW, Cooling and Vacuum systems and high alignment requirements.

The interaction of the proton beam with the PBW generates a large amount of secondary radiation that is deposited in the Port Block and CPipe, which represents an additional thermal power that must be evacuated thus avoiding thermal deformations that would prevent a correct "performance" of the PBW seals. To achieve it, a system of milled channels has been designed on each of the faces of the Port Block, controlling thermal deformations below 100 microns.

The CPipe that connects with the MV, the Connecting Pipe, is a 400mm diameter and 600mm long tube, consisting of a section cooled by a helical channel machined on the outside, together with an expansion bellow at its other end. The function of this tube is to close the atmosphere of the Target, while it has the secondary function of evacuating the deposited power while the bellows decouple the MV loads from those of the Port Block and Vessel assembly. To guarantee the manufacturability and tightness of the CPipe, a prototype was made. This prototype was subjected to a pressure test, and a cooling test using a thermography system.

PBW-Vessel after pressure test

PBW Port Block during milling of of sealing surfaces

"ESS Bilbao has been awarded a contract to perform the thermomechanical design for the PBI (Proton Beam Instrumentation) to be installed in the PBW. In this way, we hope to help the other stakeholders to finish defining their interfaces with our component; while we manage to make visible the technical capabilities of our thermomechanical design team"

Raúl Vivanco

"Having to be prepared for both pressure and vacuum operation has required a complex design, both in the sizing of all the parts in both environments, as well as the use of special spring gaskets for leaks. The manufacture of the PBlock is a challenge as it is a 600x600mm forged piece, cooled on all sides, together with a 4m high vessel that must be manufactured entirely by welding, complying with the RCC-MRx and PED regulations", Raúl Vivanco affirms.

The pressure test on the assembly has just been completed reaching the desired pressure without any leaks detected.

The component is now in the dimensional control process, to later be sent to external facilities for cleaning and preparation for vacuum tests. The delivery of the component at ESS in Lund is currently scheduled for August-September of this year.

Strategic Process towards Sustainability and an Advanced Management Model at ESS Bilbao

FIAMMA GARCÍA-TORIELLO,
Head of Management Office

Strategic planning is the key to aligning all the elements of an organization to achieve the objectives set and thus obtain the best results for both the organization and the people who make it up.

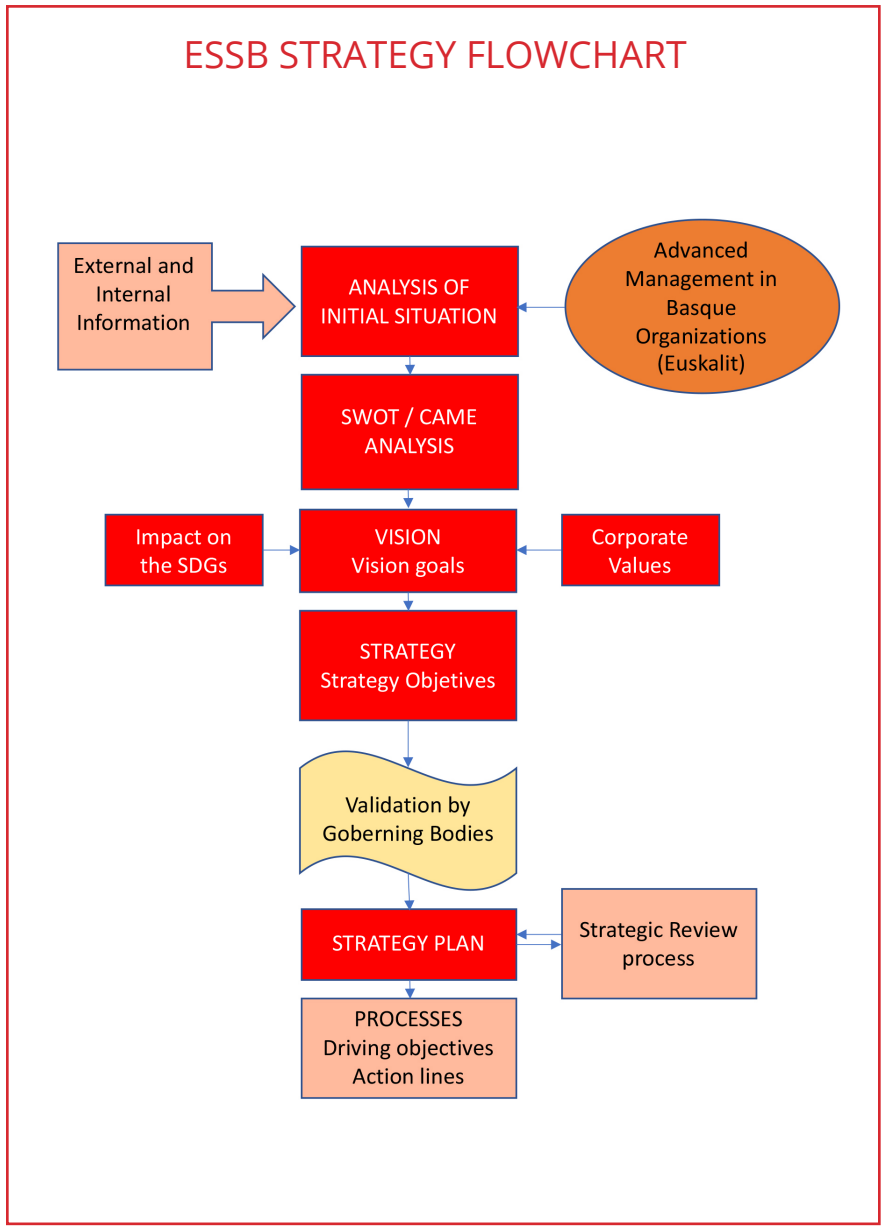
ESS BILBAO has begun a process of strategic reflection aimed at establishing the operating objectives and the master lines of the way forward in the medium and long-term for the sustainability of the organization.

"This process will help us on the road ahead until 2025. At the moment we are already delivering a large part of our contribution to the European Spallation Source (ESS ERIC) very successfully. Most of the components of the accelerator have already been delivered, such as the MEBT or the RF system, and the target work packages that are expected to be completed in one or two years have also begun to be delivered, leaving only Miracles until 2025. It was therefore the moment to stop and think, where do we want to go? Where do we want to be in 2025?", explains Fiamma Garcia-Toriello, head of the ESS Bilbao Management office and in charge of leading the strategic process.

"We have an acquired know-how that should not be lost, we are a young organization that is delivering very complex components to the ESS at the cutting edge of science technology valued at about €50M. We have positioned ourselves as an organization capable of efficiently and successfully managing in-kind scientific projects and this gives us an added value that it would not make sense to lose. For all this we must chart our way to move forward as an organization beyond 2025.

It is clear for us that there are many national and international scientific projects in which we can participate and collaborate, and we are demonstrating that we are competitive and complementary when working with other international centres and with Basque and Spanish industry", says Ms G-Toriello.

"We have reviewed the Vision of the organization and we have outlined our goals, considering our stakeholders, the market, and the social and economical environment. Those vision goals are our arrival horizon: How we want to be and where we want to be in 2025"



Some previous strategic work was carried out in recent years, such as the implementation of the Quality system, the establishment of objectives in some divisions, a first scorecard with indicators or the work developed to position the organization in the competitive market. However, it was necessary to round up and link everything under the same umbrella and embark all the divisions and people of the organization on a common search for the same objectives, and that is what is currently being worked on.

For the execution of this strategic process, we have had the support of experts in the area, in this case the company *Acorde Consulting* is guiding us in the different steps of the process.

The first step was to carry out a self-assessment of the current situation of the Consortium, according to the Advanced Management Model (https://www.euskalit.net/en/), to identify what things were being done well and which could be improved. In recent years, the organization has looked at itself in the mirror of *Advanced Management for Basque Organizations* as a model, and it is already considered as an objective for the management of the Consortium.

After this self-evaluation, the real process of strategic reflection began, with a review of the existing SWOT by the entire Management Committee, followed by a CAME analysis, which has helped to detect the strengths to reinforce and the weaknesses to correct.

Reviewing the Vision

"With this analysis in mind, we have reviewed the Vision of the organization and we have outlined our goals, considering our stakeholders, the market, and the social and economic environment. Those vision goals are our arrival horizon: How we want to be and where we want to be in 2025, and are also the basis for the strategic map", says G-Toriello.

With a clear vision of what The Consortium want to achieve by 2025 and the results it seeks to obtain, one of the main contributions of the Strategic Reflection process is the determination of the key objectives of the organization in the long term.

Some priority lines have been defined and at this moment the Management Committee is already defining and specifying the strategic objectives, that is, the key long-term objectives that will have linked indicators, to analyse their achievement and development. These strategic objectives of the organization will end up being deployed in driving-process-subprocess objectives at all levels, until the individual objectives are reached.

The next step will be its presentation for validation and approval by governing bodies, before continuing and extending it to the entire organization.

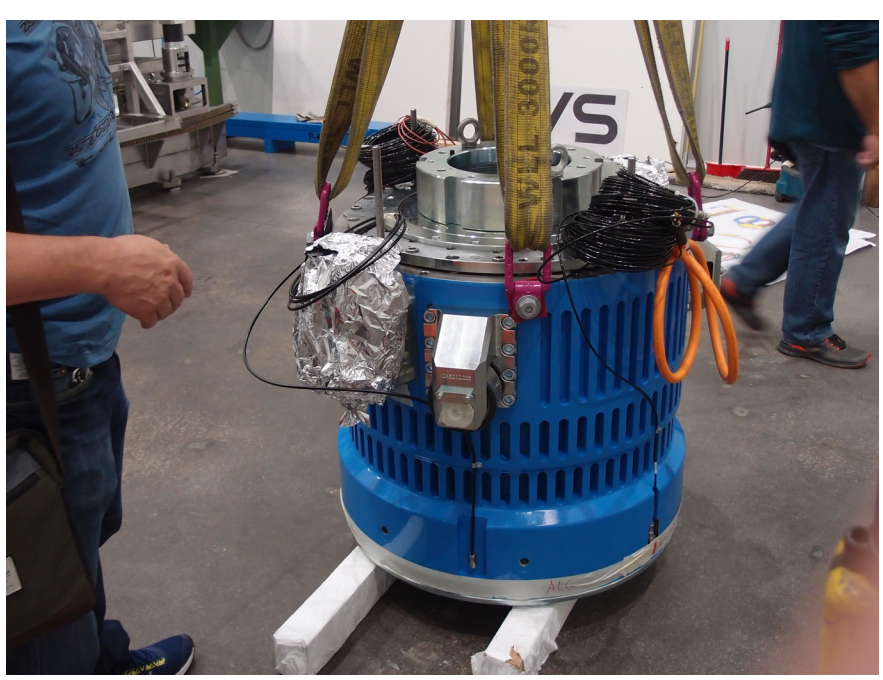
Fiamma G-Toriello explains, *"within this strategic reflection we are also working on an analysis of the impact of ESS Bilbao on the SDGs, as well as the definition of the Values we want the organization to live by. Corporate values provide a common sense of direction, and guidelines for behaviour and attitude to all the people who make up the organization"*.

This entire process will culminate not only with strategic objectives, and a balanced scorecard with indicators for the organization, but also in a **Strategic Review process**, that is, an effective method to review, define, and adapt the Plan if necessary. The key is flexibility and adaptability. And although the horizon is clear, each moment is different from the previous one and the strategy must accommodate different circumstances.

WHAT'S GOING ON AT ESS BILBAO

TARGET

The FAT tests for the drive unit have been done successfully. Currently the vacuum tests for the Shaft and CPipe are being carried out at the Thuneureka facility in Galicia. The Cassettes (spallation material + stainless steel structure) have already been assembled in the Target Wheel and the PBW welding process will start in the coming weeks. In the next months, the ESS Bilbao team will be ready for the integrated tests of all components.



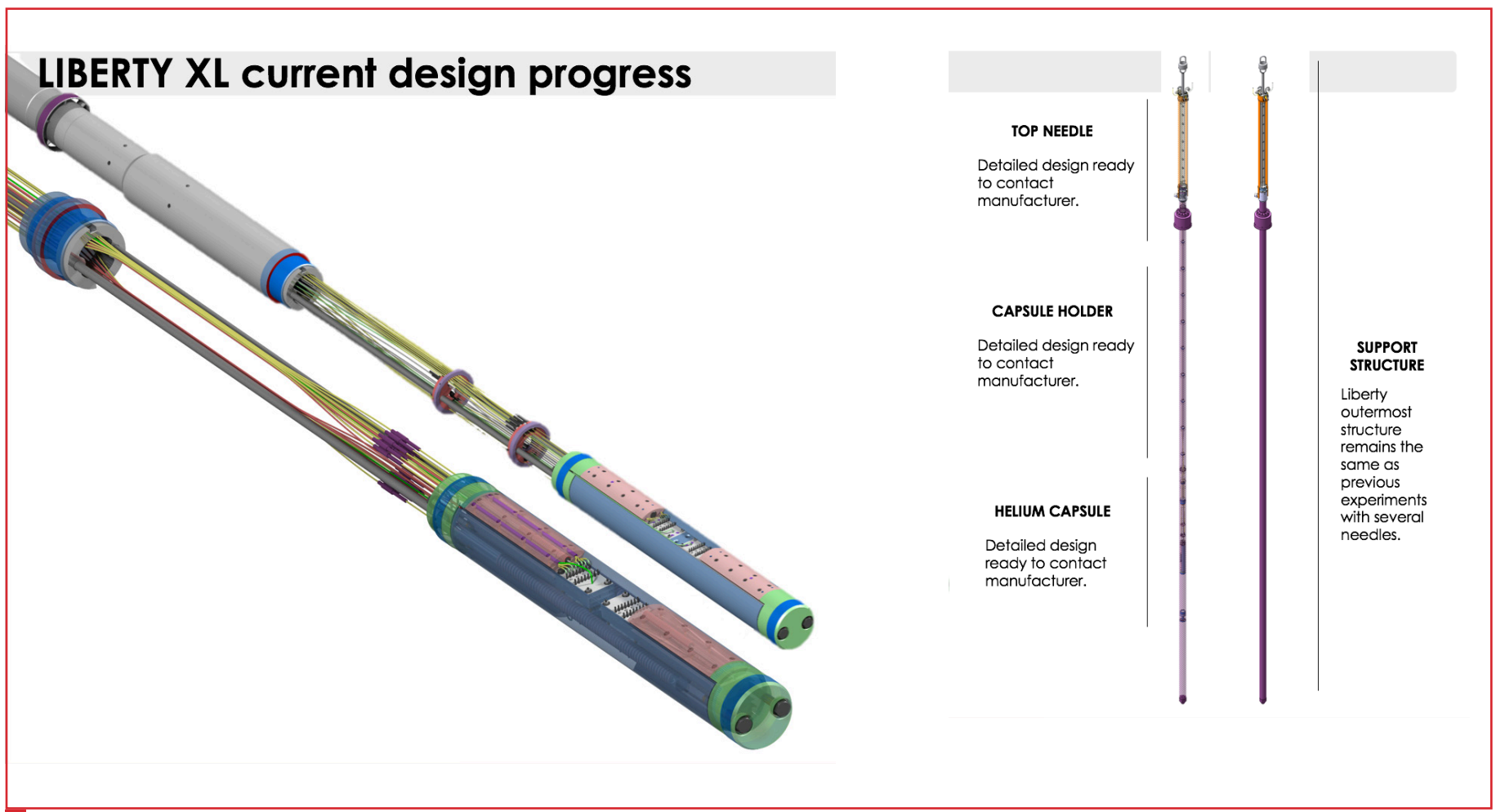
EMU- MYRRHA

EMU-MYRRHA

In 2020 ESS Bilbao, leading a consortium together ProActive R&D, was awarded a contract with SCK CEN for the public tender purchase of a *"transverse emittance meter based on slit-grid systems for high intensity hadron machines"* in the context of the development of the linear accelerator of the MYRRHA / MINERVA project, for transverse characterization of the beam and commissioning of the LINAC.

Within the consortium, ESS Bilbao is leading the tasks related to irradiation analysis, control system and emittance meter integration, and ProActive R&D and is also responsible for the design and manufacture of actuator systems (slits & grids) and tanks. The project is ongoing and has already successfully passed its Critical Design Review.

BOLOMETERS

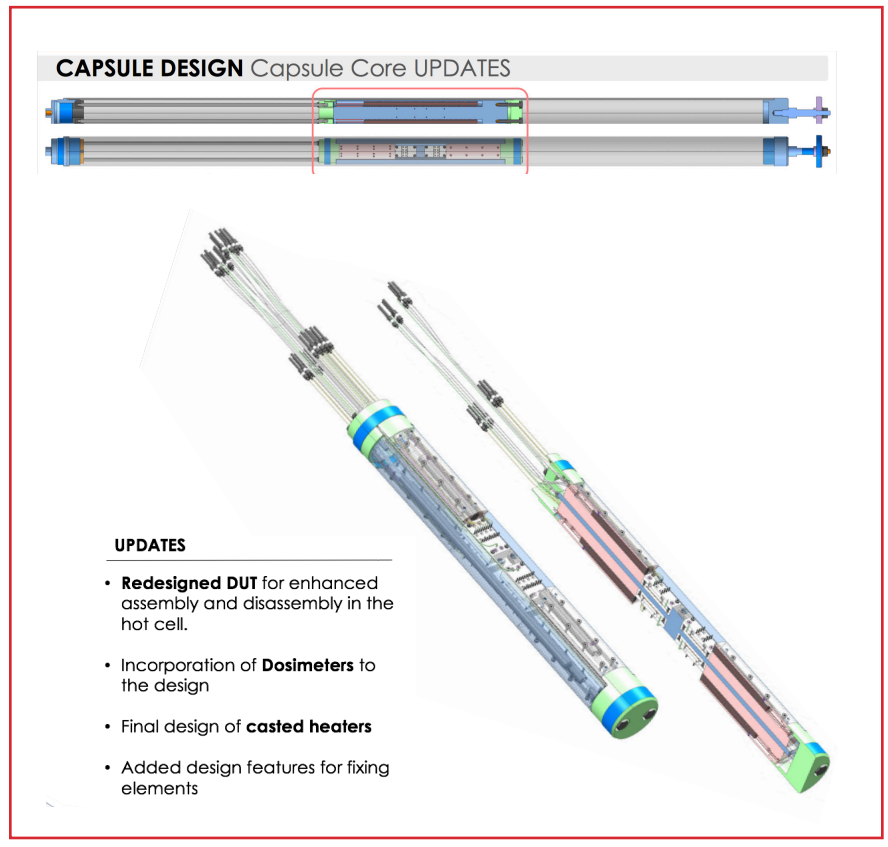


Liberty bolometers design and assembly process

At the beginning of 2021, European Spallation Source Bilbao (ESS Bilbao), as part of a team led by ALTER TECHNOLOGY TÜV NORD (ATN) and also involving Studiecentrum for Kernenergie Centre d'Etudes de l'Energie Nucléaire (SCK CEN) as third technical parties, were awarded a contract by Fusion for Energy (F4E), the EU organisation responsible for Europe's contribution to ITER, for the irradiation testing of bolometer-sensor prototypes (F4E-OPE-1084 lot 1).

The team formed by ESS Bilbao, ATN and SCK CEN cover all the capabilities needed::

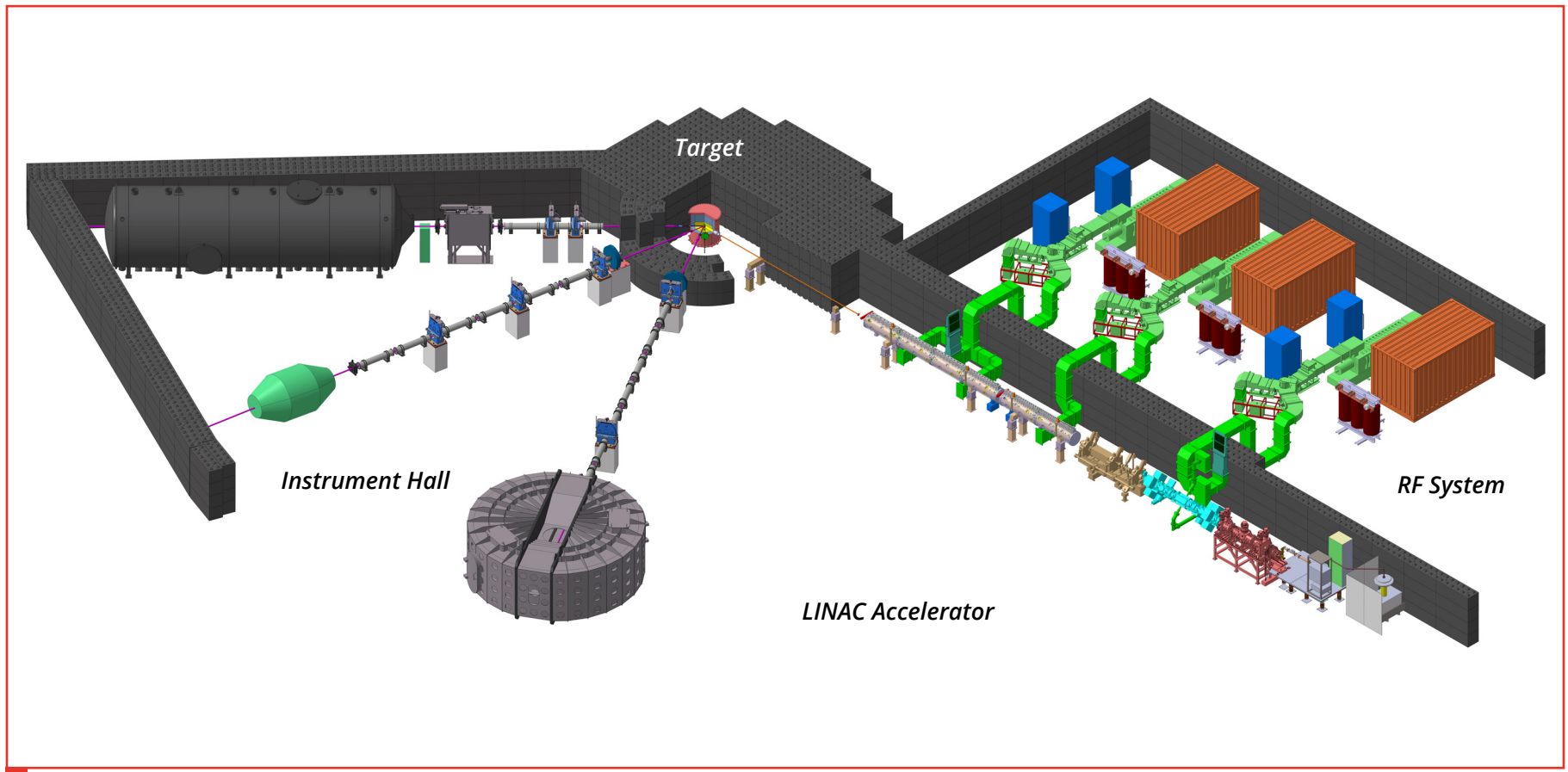
- ATN will act as prime contractor and will take over the activities related to test rig commissioning, test rig manufacturing, data acquisition system, acceptance tests of bolometers, reference data measurements, and management and reporting.
- SCK CEN is the owner of the reactor BR2 that will be used and will be in charge of such activities as irradiation tests (radiation, online tests, dosimetry, storage and disposal of activated materials) and port irradiation examination tests, as well as giving support to ATN throughout the project.



- ESS Bilbao will be in charge of the development of the test rig: design, modelling and manufacturing engineering.

NEW HORIZON FOR NEUTRONS IN EUROPE

European Low-Energy, Accelerator-Based Neutron Facility Association-ELENA



ARGITU layout.

The need to maintain high standards in neutron scattering research in Europe has led to a search for alternatives to traditional infrastructures. This fact, among others, has led a group of leaders in neutron research to shape a new horizon for the future landscape of research infrastructures. ELENA is one of the outcomes of this idea.

Neutron scattering research contributes to areas ranging from fundamental research in elementary particle and nuclear physics to condensed matter physics and chemistry, soft matter science, life science, geoscience and engineering material science, or to health, environment, food, and cultural heritage. Neutrons contribute to the characterization of almost any new material issued from modern research.

Not-for-profit association

ELENA is a not-for-profit association formed to promote cooperation between European laboratories, companies and researchers working in the field of low energy accelerator-based neutron sources.

The main goal of the association is to close the gap which is opening in Europe with the ongoing shutdown of research reactors by joining forces to promote Low Energy Accelerator Based Neutron Sources as an alternative.

Outstanding ideas always find their way. Similar concepts for a novel neutron research facility have been developed in various places in Europe. Following a good tradition of collaboration in Europe, with ELENA we have found a way to combine our efforts and achieve the best possible results.

Prof. Dr. Thomas Brüeckel, Jüelich Centre and Chairman of the ELENA Association.

Europe has traditionally led the field for more than 40 years and achieved a strong position in neutron science, with a community of more than 5,000 scientists. The well-established European network of neutron sources is threatened by the slow disappearance of older research reactors. There is a clear understanding that a renewed hierarchical network of small-to-medium-sized facilities is needed in the future. Several ongoing European projects clearly demonstrate that neutron sources based on low energy (up to 100 MeV) proton accelerators provide an attractive option to replace ageing research reactors.

Advantages

There are several clear advantages of these type of sources: they are scalable, the capital and operation costs are smaller than comparable reactor-based facilities, they do not need nuclear licensing, and due to the lower security requirements, they can be set up and operated in a flexible manner.

In the words of Prof. Dr. Thomas Brüeckel, *"in the field of research with neutrons, we are very fortunate in Europe: we host the world's leading neutron source, the ILL in Grenoble, and look forward to the commissioning of the future flagship, the ESS in Lund. The latter will enable entirely new types of experiments. However, this major investment, to which many countries contribute, can only bear fruit if it is underpinned by a network of national or regional sources. Within ELENA, we are working together for a bright future of research with neutrons by contributing to the creation of a new ecosystem of European neutron research facilities."*

ELENA
European Low Energy accelerator-based Neutron facilities Association

ELENA foundation

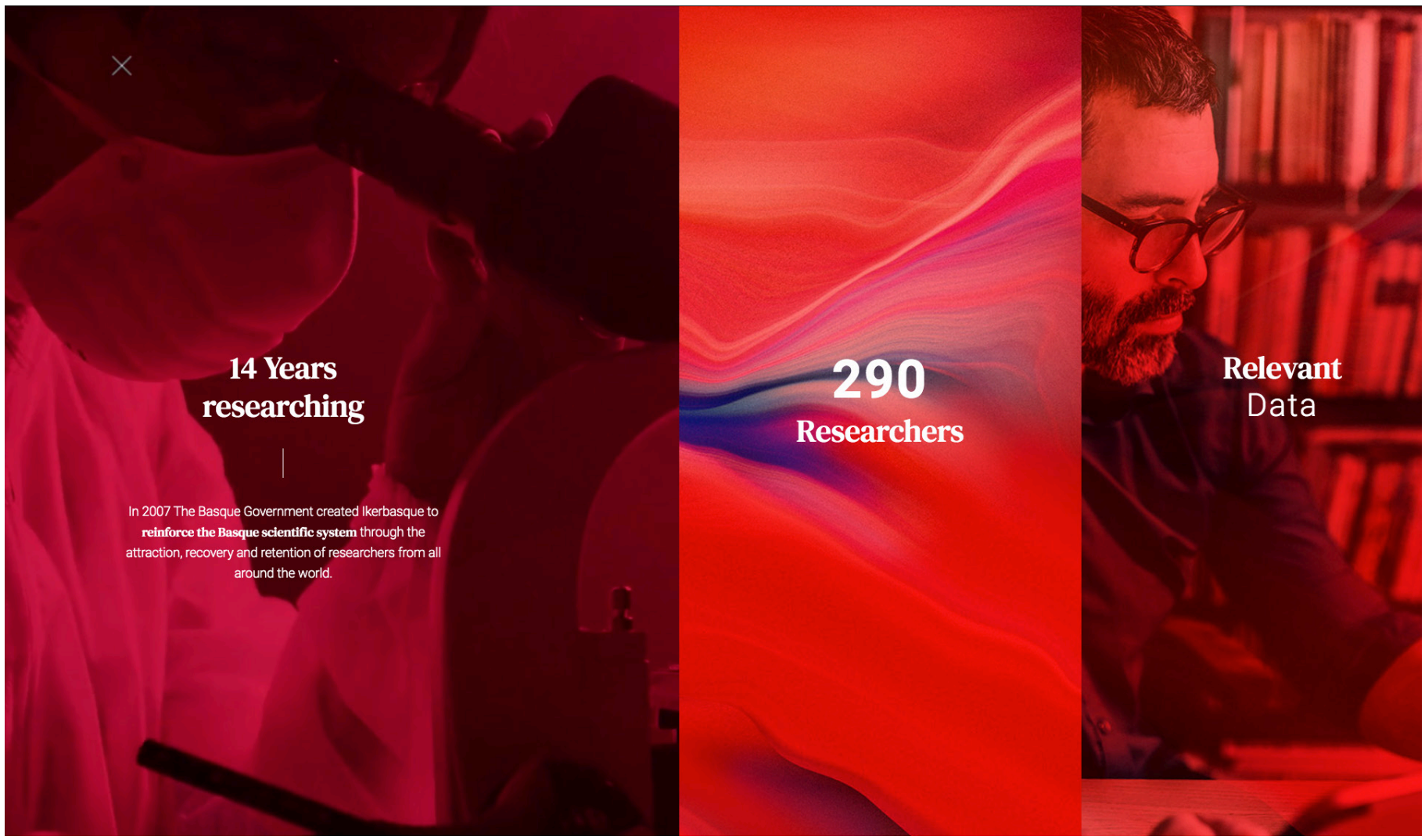
On September 10th, 2020, ELENA was founded by members from ESS-Bilbao (Spain), IFE (Norway), INFN (Italy), JCNS (Germany), LLB (France) and Mirrotron (Hungary). The members agreed to cooperate and initiate collaborations, conferences, workshops, and meetings to create an effective eco-system for research and applications in all areas of science and industry around these neutron sources.

There are already several projects ongoing in Europe ranging from small local sources at universities or industrial companies (e.g., the Mirrotron project), via medium size regional sources (e.g., the projects of ESS-Bilbao, IFE and INFN) towards high brilliance facilities (the SONATE and HBS projects of the LLB and JCNS, respectively).

ESS Bilbao is proposing ARGITU, a unique and versatile local compact accelerator-driven neutron source that would undoubtedly place the Basque country at the forefront of research in neutrons within Europe and will serve as a magnet for attracting talent, thus fostering its neutron R&D ecosystem.

ikerbasque
Basque Foundation for Science

14 years promoting scientific talent in the Basque Country



Recently awarded the Euskadi Research Prize 2020, which the Basque Government announces annually, Fernando Cossío, has been in charge as the Scientific Director of Ikerbasque, the Basque Foundation for Science, for more than 12 years.

Professor Cossío, an international benchmark in the discipline of Chemistry, considers that receiving this award has been a very important recognition both for his research and teaching career, as well as for the work carried out together with his research group.

In a year in which we have been aware more than ever that without science there is no future or well-being, from Ikerbasque we want to continue betting on people and above all, carry on supporting the centers and universities of the Basque Country in recruiting researchers

of the highest level that promote the scientific development of the country, since we understand that only with the best scientific talent, both local and international, can the Basque Country participate in the international community of science

Giving recognition to all those research and science professionals and promoting scientific activity by strengthening the teams of researchers who carry out their work in the Basque Country is a strategic challenge for the Basque Government and therefore for all the agents involved in Basque science.

Strengthening science in the Basque Country

Ikerbasque, an organization promoted by the Basque Government to strengthen science in the Basque Country through talent attraction programs to promote scientific careers, maintains permanent coordination with the different centers, institutions and organizations that make up the Basque science and technology network.

ESS Bilbao is one of the institutions with which Ikerbasque has maintained a close collaboration since its inception. Both institutions are currently committed to the Basque Government's strategic commitment to hiring Ikerbasque researchers with specific profiles in neutron science and technologies, all in line with the Horizon Europe + Talent program.

International recognition

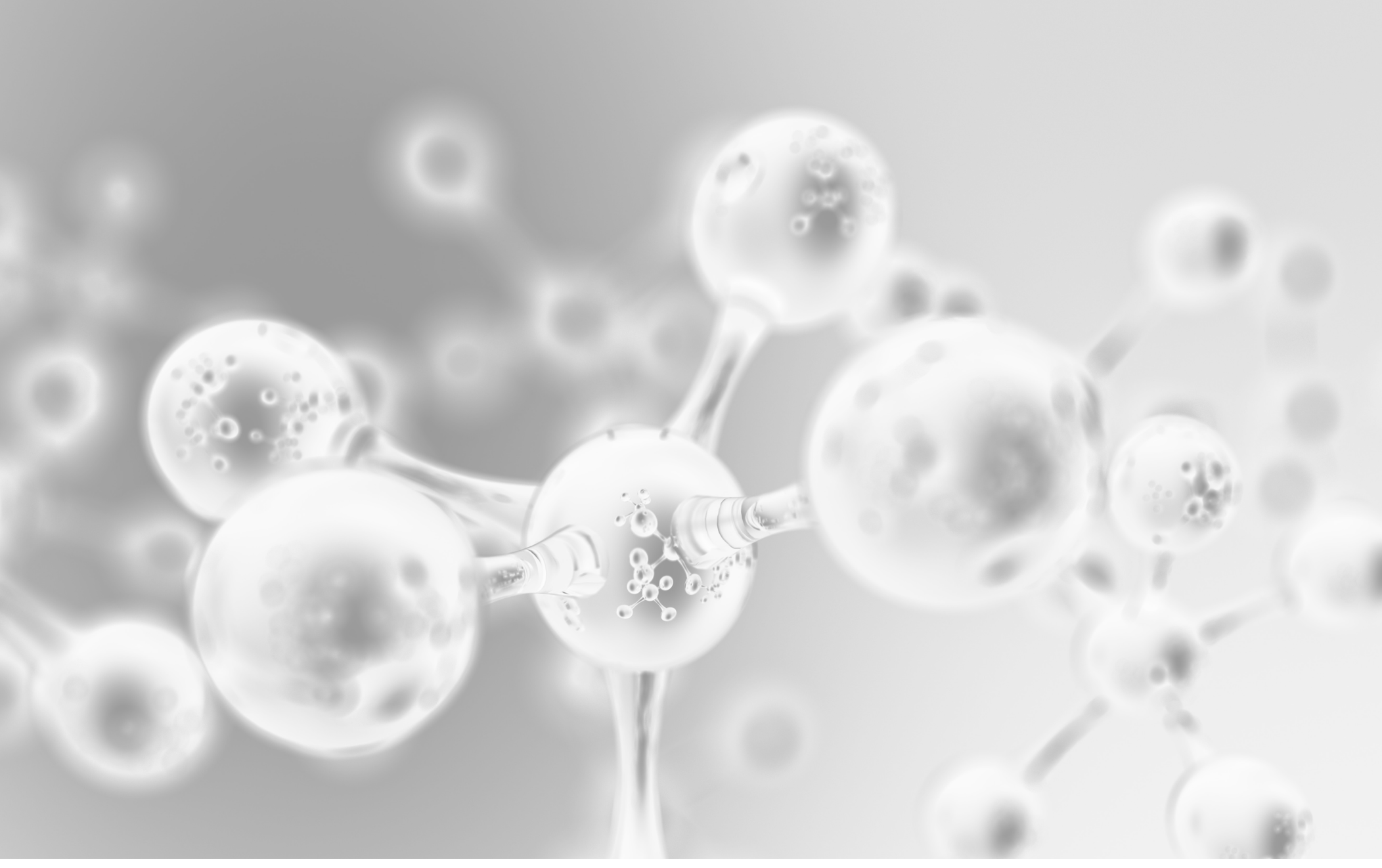
Throughout its history, the Basque Foundation for Science has funded research projects worth more than €235M, with more than 9,000 articles in high-impact indexed publications, placing it as a benchmark within the scientific community. Its team of researchers of recognized international prestige has established itself within the different multidisciplinary fields that science encompasses.

Consolidating scientific work and attracting research talent is one of Ikerbasque's missions. The future is to weave a solid network of researchers and turn them, through the promotion of their scientific careers, into references within the different disciplines that are developed in the centers and institutions of the Basque science and technology network.

Generating new scientific knowledge, incorporating, and training young research talent, advancing gender equality, increasing scientific production and international collaborations are some of the 12 challenges that Ikerbasque has set itself for the immediate future.

FERNANDO COSSÍO,
Scientific Director of Ikerbasque, Basque Foundation for Science

Recently awarded the Euskadi Research Prize 2020, which the Basque Government announces annually, Fernando Cossío, has been in charge of the Scientific Directorate of Ikerbasque, Basque Foundation for Science for more than 12 years.



ESS - BILBAO, THE SPANISH CONTRIBUTION TO EUROPEAN RESEARCH EXCELLENCE

ESS bilbao

newsletter

SEPTEMBER 2021