COLLABORATIONS BETWEEN DIFFERENT AGENTS OF THE SPANISH SCIENCE INDUSTRY

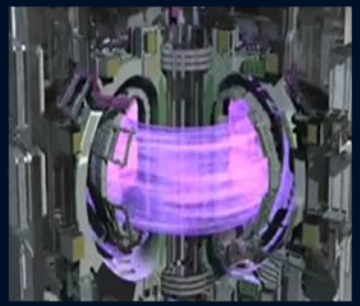
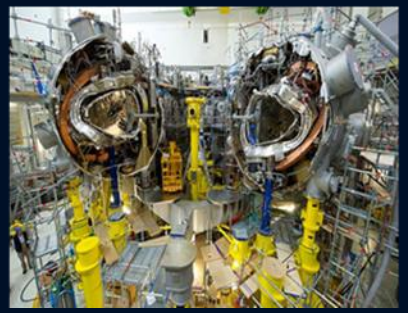
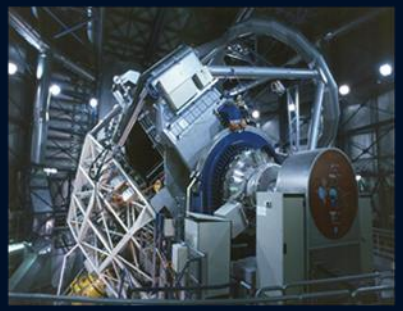
Fukuoka,
29 05 2018

Fco. Javier Cáceres
fjcaceres@ineustar.com

SCIENCE INDUSTRY IS THE ECONOMIC SECTOR WHICH INCLUDES THE COMPANIES DEVOTED TO THE DESIGN, ENGINEERING, CONSTRUCTION, UPDATING AND KEEPING OF MAIN SCIENTIFIC RESEARCH FACILITIES, ITS EQUIPMENT AND OTHER RELATED INSTRUMENTS





COLLABORATIONS BETWEEN DIFFERENT AGENTS ARE ESSENTIAL IN SCIENCE INDUSTRY

Science Facilities

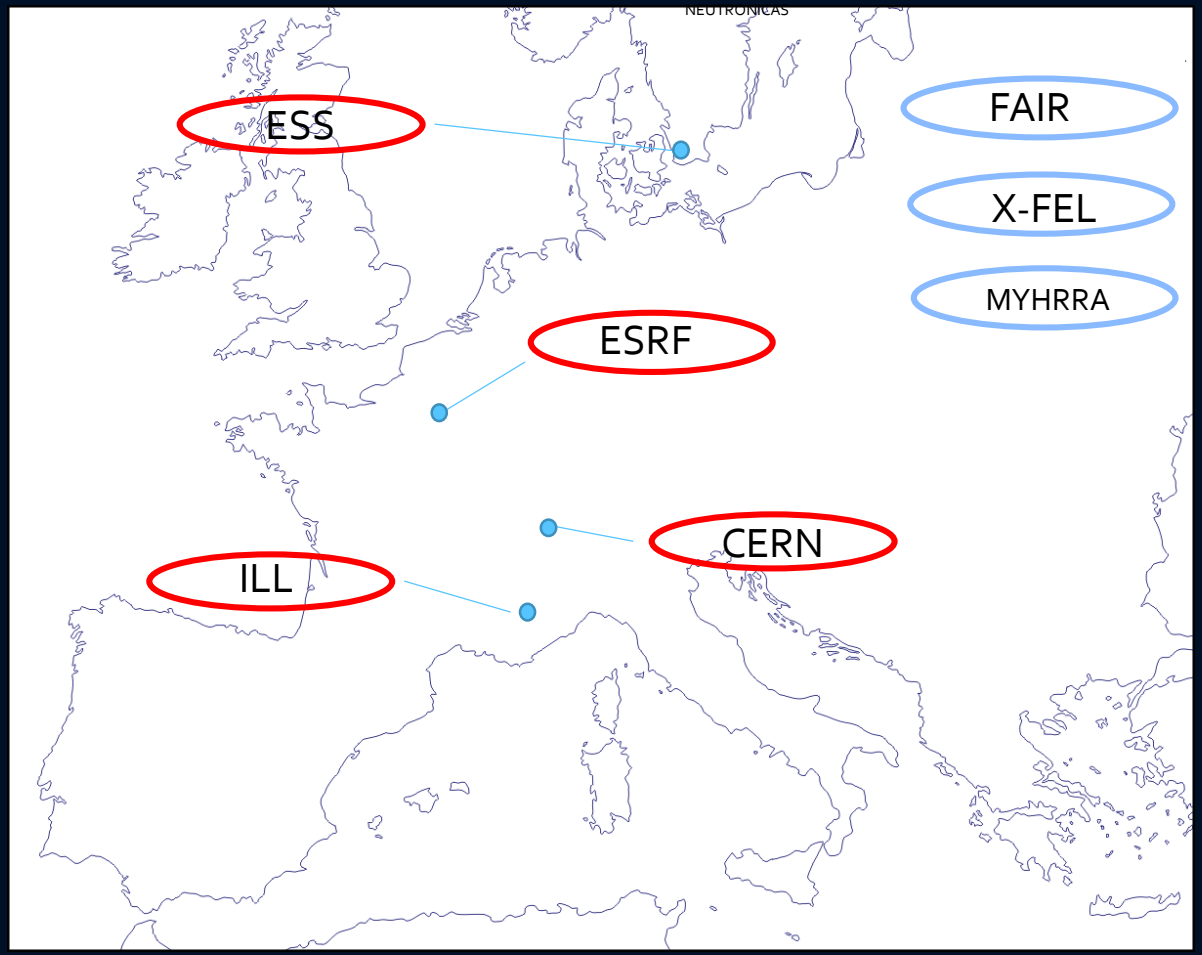
SCIENCE INDUSTRY SPANISH AGENTS

National. Particle Physics

Science Facilities

SCIENCE INDUSTRY SPANISH AGENTS

International Spanish contributions. Accelerators and PP.



Industry. First Tier

SCIENCE INDUSTRY SPANISH AGENTS

the vacuum projects
doilan TEGIA S.Coop.
monocrom
NEUREUS TECHNOLOGIES
Jema
QUASAR SCIENCE RESOURCES, S.L.
KARTEN
cadinox
avs added value solutions
AERnnova
TTi
swisslan precision machining
DMP Egile
INTEGRASYS
SENER
PROCON SYSTEMS
s+concept soluciones sostenibles
hib HIGH IDENTITY BUILDINGS
EMPRESARIOS AGRUPADOS
MANCISIDOR
MMP MECANIZADOS MANDRINADOS DE PRECISIÓN
INMEPRE, S.A. INDUSTRIAS MECÁNICAS DE PRECISIÓN
AWGE TECHNOLOGIES
ADEX
MONDRAGON HUMANITY AT WORK Finance Industry Retail Knowledge
ensa
SCIENTIFICA
ELYTT ENERGY
SENEN Solutions
idom
serkide integral services
antec APLICACIÓN NUEVAS TECNOLOGÍAS, ANTEC S.A.
Fractal
asturfeito spirit of advance

Universities

SCIENCE INDUSTRY SPANISH AGENTS

Universidad de Huelva

Vniversitat de València

IFIC Institut de Física Corpuscular

Vniversidad de Salamanca
CAMPUS OF INTERNATIONAL EXCELLENCE

Vniversitat de València

Universidad de Granada
Departamento de Física Atómica, Molecular y Nuclear

Universidad del País Vasco / Euskal Herriko Unibertsitatea
Zientzia eta Teknologia Fakultatea
Facultad de Ciencia y Tecnología

UC Universidad de Cantabria

IFCA Instituto de Física de Cantabria

Universidad de Sevilla

Politécnica Madrid

IFN Instituto de Fusión Nuclear

UCLM Universidad de Castilla-La Mancha

UAB Universitat Autònoma de Barcelona

IFAE Institut de Física d'Altes Energies

Universidad de Córdoba

Universitat de Barcelona

inei Instituto de Investigaciones Energéticas y Aplicaciones Industriales
Universidad de Castilla-La Mancha

1542 Departamento de Física Teórica
Universidad Zaragoza

Universidad Complutense Madrid

Public Administration

SCIENCE INDUSTRY SPANISH AGENTS

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA, INDUSTRIA Y COMPETITIVIDAD

SECRETARÍA DE ESTADO DE INVESTIGACIÓN, DESARROLLO E INNOVACIÓN

SECRETARÍA DE ESTADO DE COMERCIO

EUSKO JAURLARITZA
EKONOMIAREN GARAPEN ETA AZPIEGITURA SAILA

GOBIERNO VASCO
DEPARTAMENTO DE DESARROLLO ECONÓMICO E INFRAESTRUCTURAS

JUNTA DE ANDALUCIA

CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

ICEX

Gobierno de Canarias

AGENCIA ESTATAL DE INVESTIGACIÓN

FECYT
FUNDACIÓN ESPAÑOLA PARA LA CIENCIA Y LA TECNOLOGÍA

CDTI
Centro para el Desarrollo Tecnológico Industrial

Generalitat de Catalunya

FPA

...

Centers of Technology and KT

SCIENCE INDUSTRY SPANISH AGENTS

tecnalia
Corporación Tecnológica

IK4
Research Alliance

CPAN
Ingenio 2010

BCMATERIALS
BASQUE CENTER FOR MATERIALS, APPLICATIONS & NANOSTRUCTURES
ehugroup

DIPC
Donostia International Physics Center

itma
MATERIALS TECHNOLOGY

CIC nanoGUNE
nanoscience cooperative research center

IREC
Institut de Recerca en Energia de Catalunya
Catalonia Institute for Energy Research

BIST
Barcelona Institute of Science and Technolo

Fundació
b_TEC
Campus Diagonal-Besòs

ineustar
Asociación Española de la Industria de la Ciencia

CNA
Centro Nacional de Aceleradores

Users

SCIENCE INDUSTRY SPANISH AGENTS

R & D projects

- Cosmetics
- Pharmaceutical
- Medical Equipment
- Universities

Use of facilities and instrumentation

- Heritage and Art
- Science Industry companies
- Universities

Testing and certification

- Industrial Equipment manufacturers
- Microelectronics
- Security

Private-Public collaboration is not easy but it´s indispensable to develop a SCIENCE-TECHNOLOGY-INDUSTRY-ECONOMY-SOCIETY system, that is free-flowing and efficient.

SOME TYPICAL BARRIERS

- Different Operation paces
- Different Priorities
- Different Regulations
- Low mobility of human resources
- Different levels of R & D culture assimilation
- R&D as expense vs investment
- Lack of enough experience at mixed teams management
- Collaboration models without incentives

Collaboration among different agents has a great variety of models.

We have tried many of them, with mixed results.

In our opinion, only the collaborations where all the partners win something, have real opportunities to succeed.

The key to success is to know what are the objectives of the counterpart(s) and try to make those, compatible with our own objectives.

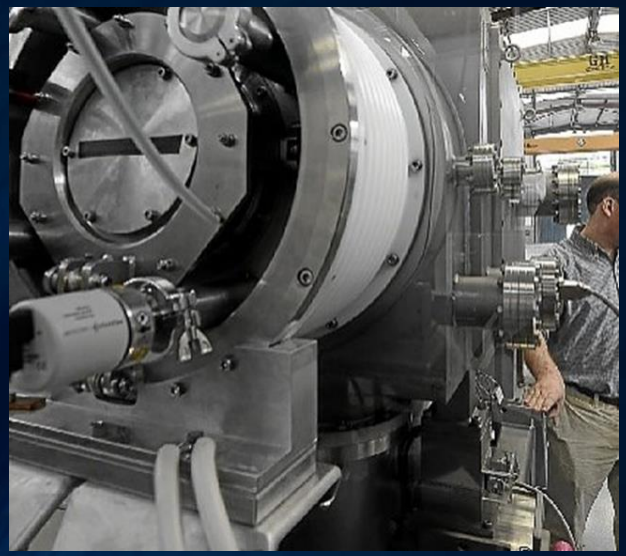
… let´s share some of our examples with different agents

Collaboration among agents. EXAMPLE I

Science Facilities	Centro de Técnicas Neutrónicas. ESS-B. Bilbao
Centers of Technology and KT	INEUSTAR Corporación Tecnalia
Industry. First Tier	INEUSTAR and INDUCIENCIA associated Companies
Public Administration	Spanish State Government. Basque Local Government
Users	General Industrial companies. Other Science Facilities and Labs

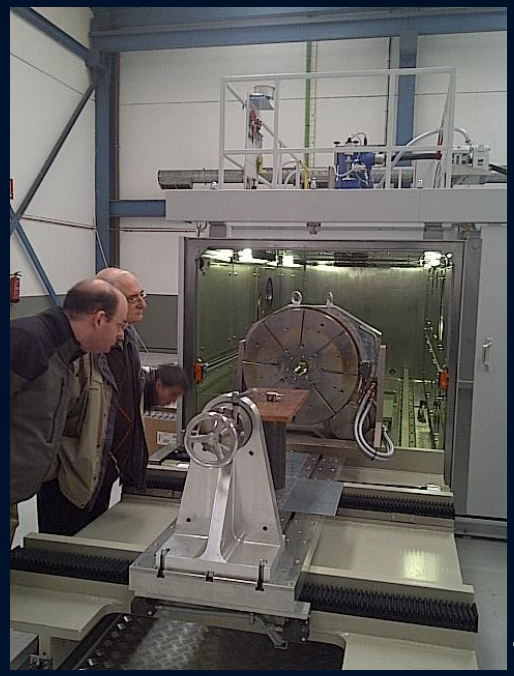
Implementation and operation of **Advanced Welding Facility Center.** Vitoria. Spain.

Objective: To have nearby the possibility to weld special components by EBW and Brazing at a very reasonable cost, without the financial burden of the initial costs and maintenance.



Collaboration among agents. EXAMPLE I

Science Facilities	Centro de Técnicas Neutrónicas. ESS-B. Bilbao	Get the necessary equipment. Facilitates economic impact. Diminish the operation costs.
Centers of Technology and KT	INEUSTAR Corporación Tecnalia	Provides good service to the associated companies. Foster collaborations. Facilitate increase of competitiveness. Management contract.
Industry. First Tier	INEUSTAR and INDUCIENCIA´s associated companies	Get strategical advantages. Diminish costs. Include special technologies. Increase competitiveness
Public Administration	Spanish State Government. Basque Local Government	Provide good service to science/industry at lower costs
Users	General Industrial companies. Other Science Facilities and Labs	Get a nearby special facility and skills at a very reasonable cost. Increase their opportunities.



Collaboration among agents. EXAMPLE II

Science Facilities
CIEMAT
Madrid

Centers of Technology and KT
INEUSTAR
On-Granada

Industry. First Tier
INEUSTAR and
INDUCIENCIA associated
Companies.

Public Administration
Spanish State Governmt.
Andalusian Governmt.
Granada Province Local Governmt.

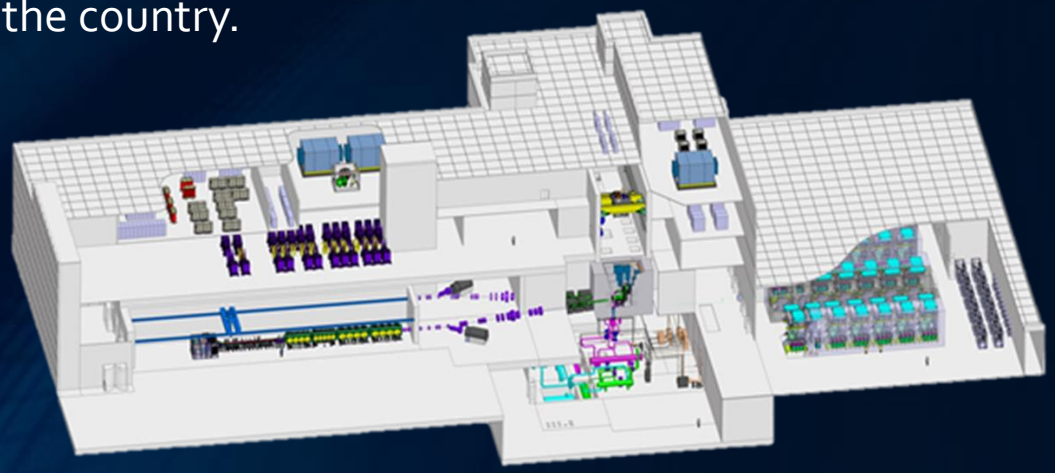
Users
Spanish Fusion community.
Medical community.
Industrial advanced sectors.

Universities
Granada University UGR.

Spanish Candidature to locate IFMIF-DONES accelerator at Granada.

Granada. Spain.

Objective: To win the international bid to locate that medium-size research facility in the city of Granada in order to continue the big Spanish contribution to ITER (Cadarache) and to IFMIF (Rokassho) and boost Fusion Materials, Accelerators research, and Applied Technologies in the country.



Collaboration among agents. EXAMPLE II

Science Facilities	CIEMAT Madrid	Main scientific interface for fusion matters in Spain. Relevant activity on accelerators. More research.
Centers of Technology and KT	INEUSTAR On-Granada	Get more industrial and business opportunities for their associated members. Get an important industrial infrastructure.
Industry. First Tier	INEUSTAR and INDUCIENCIA associated Companies.	Get more business opportunities, more references, improve skills and technological research.
Public Administration	Spanish State Governmt. Andalusian Governmt. Granada Province Local Governmt.	Invest wisely. Foster more high level local jobs. Help to create more activity.
Users	Spanish Fusion community. Medical community. Industrial advanced sectors.	Get a very important research facility for ITER and future fusion machines. Boost the international collaboration (IFMIF-EVEDA). Get companion infrastructure of the Health Science Park already at Granada.
Universities	Granada University UGR.	Increase the Physic Sciences activities at UGR.

Collaboration among agents. EXAMPLE II

Granada is already the European choice for IFMIF-DONES.

Collaboration among agents. EXAMPLE III

Science Facilities — CIEMAT

Industry. First Tier — SEVEN SOLUTIONS SL.

Universities — Granada University. UGR

Development and commission of Low-Level Radio Frequency systems (LLRF) for IFMIF-EVEDA

Objective: To control & tune the RF cavities in the accelerator, including synchronization, data logging and fast interlock control.

Use of **White Rabbit technology** for Master Oscillator distribution and timing synchronization (post mortem analysis, fast interlocks and controls)

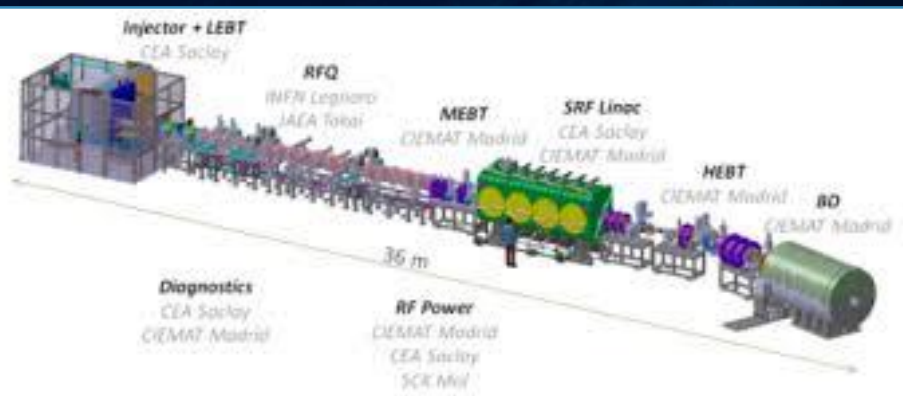
•And the **RF distribution** for other RF system parts, BPMs, RF monitoring,…

Collaboration among agents. EXAMPLE III

Science Facilities — CIEMAT → Main scientific interface for fusion matters in Spain. Relevant activity on accelerators. More research. First interface as Spanish focal point for IFMIF-EVEDA contribution

Industry. First Tier — SEVEN SOLUTIONS SL. → Experts and one of the global leaders in Time Sensitive Networks (TSN). More business, more references.

Universities — Granada University. UGR → Increase specific knowledge because some Seven Solutions executives are lecturers at the Sciences Faculty. More job opportunities for young graduates



Collaboration among agents. EXAMPLE IV

Science ⟷ Technology ⟷ Industry

eman ta zabal zazu
Universidad del País Vasco
Euskal Herriko Unibertsitatea

Universidad Politécnica Madrid

UC Universidad de Cantabria

CSIC Consejo Superior de Investigaciones Científicas

BCMATERIALS Basque Center for Materials, Applications & Nanostructures

CFM Materials Physics Center / Centro de Física de Materiales

S.E. T.N.

tecnalia Inspiring Business

IK4 TEKNIKER Research Alliance

ceit IK4 Research Alliance

ESS bilbao

ineustar Asociación Española de la Industria de la Ciencia

AERnnova

Antec

avs added value solutions

AWGE Technologies

cadinox

ELYTT ENERGY

ensa

enwesa

Jema innovative energy

PROACTIVE R&D

SCIENTIFICA Precision Equipment for Science

swisslan precision machining

the vacuum projects

Collaboration among agents. EXAMPLE IV

- ESSB Spain (Research Facility),
- SNS USA (Research Facility) and
- JEMA ENERGY, SA, Spain (industrial company).

Goal: To develop a special high power modulator.

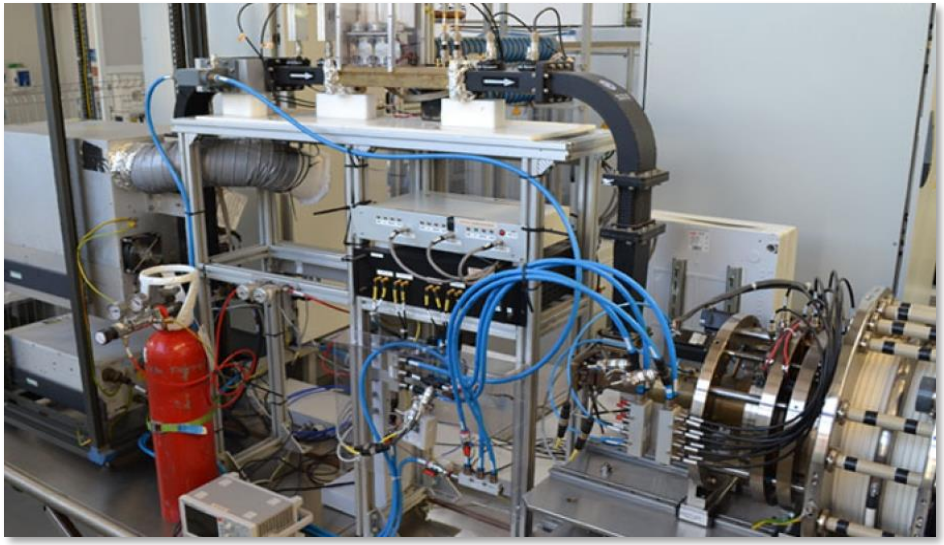
The technology research and development was successful.
The research centers got the equipment they needed and the company acquired new knowledge and skills.

In 2017: JEMA ENERGY, SA won the bid for 3 warm-linac modulators and 9 medium-beta modulators, based on the topology developed in collaboration.

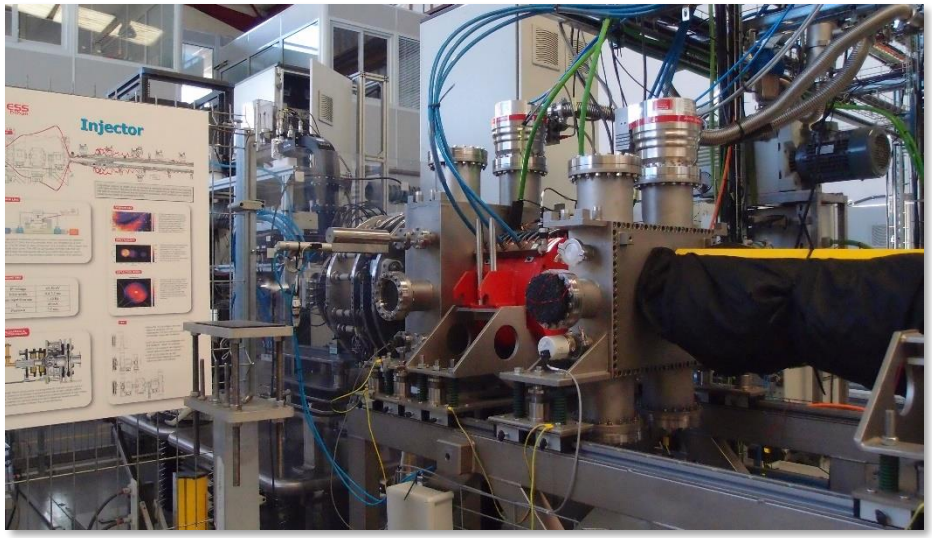
Collaboration among agents. EXAMPLE IV

- ESSB Spain (Research Facility),
- UPV-EHU (University),
- ELYTT ENERGY, SL (industrial company)
- AVS (industrial company)

Goal: To develop a ECR proton Source LEBT and RFQ.



ECR: H+ source; 45 KeV; 50 mA

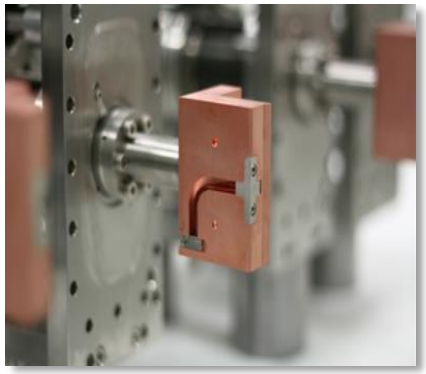


LEBT: Low Energy Beam Transport

Collaboration among agents. EXAMPLE V

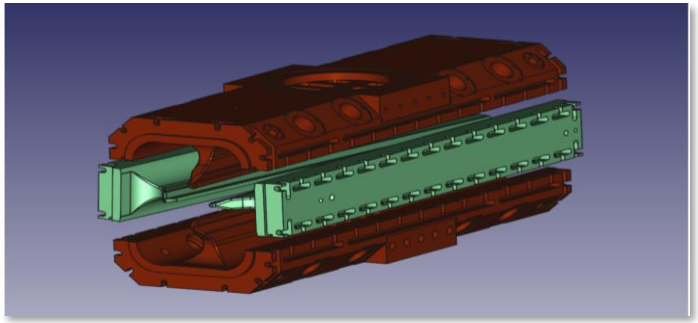
- CIEMAT
- IFMIF
- AVS

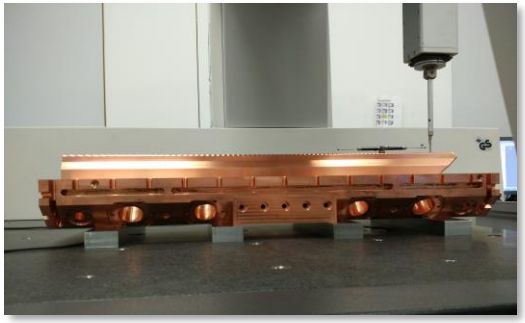
Goal: to design and provide Compact Beam Scrapers (x2 full units)



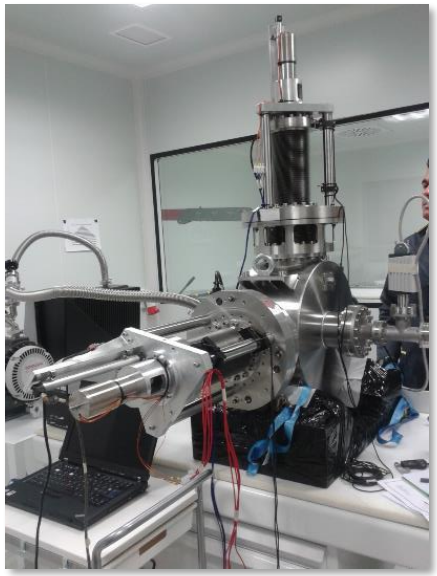
5 MeV D^+ Beam
- 125 mA CW
- Bidirectional Repeatability <5 μm
- Water cooled. Brazed CuOFE
- Hostile environment
- 60 mm between quadrupoles
- 1 MGy steppers
- 1e-8 mbar UHV

Collaboration among agents. EXAMPLES IV and V

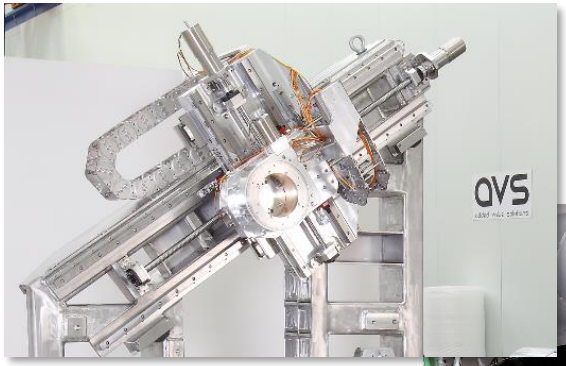


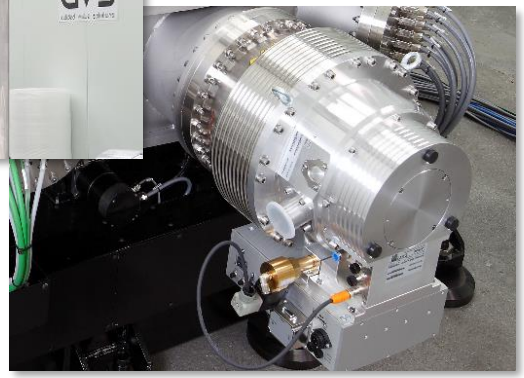


RFQ: Radio Frequency Quadrupole



LIPAC slits. HEBT. IFMIF/ CIEMAT/AVS





XES X-ray emission Spectrometer. ESRF /AVS

The experience of our associated companies working in close collaboration with the scientists at ESSB, IFIC, CIEMAT, ALBA-CELLS, CERN, ESRF,… and other facilities and universities, since an early stage, is absolutely positive in the medium and long term.

Collaboration among agents. EXAMPLE VI

Science Facilities — CERN

Centers of Technology and KT — INEUSTAR, BICs

Public Administration — Local PAs

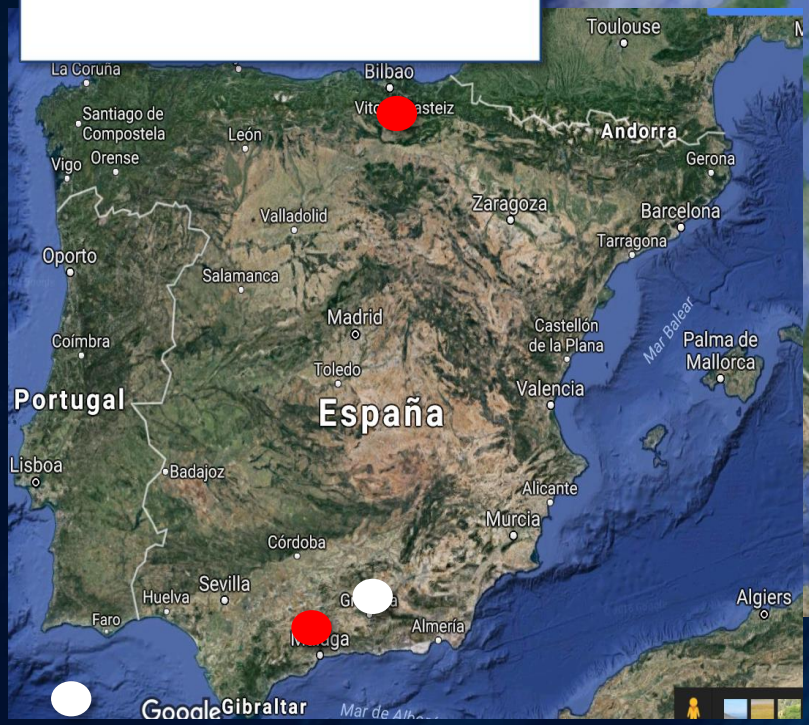
Users — Promoters, OTRIs

Promotion of high tech Start-ups based on CERN technologies

19 Octubre 2015

Collaboration among agents. EXAMPLE VI

European and
Spanish network



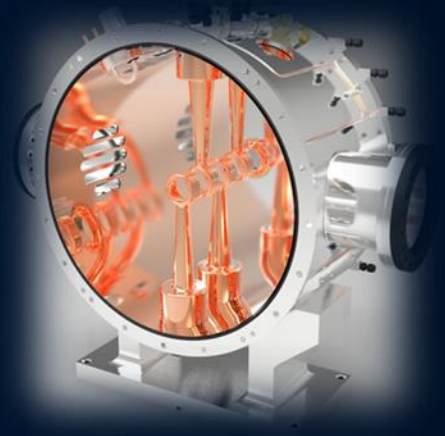
The role of the Public Administrations

SETTING PRIORITIES AND LONG TERM STRATEGIES

- PUBLIC HIGH LEVEL EDUCATION
- SCIENCE PRIORITIES
- SCIENTIFIC RESEARCH FACILITIES
- PROMOTING AND INCENTIVATE:
  - TECHNOLOGY DEVELOPMENT
  - TECHNOLOGY TRANSFER
  - INNOVATION
  - COLLABORATION AMONG AGENTS

FUNDING

- R & D PROJECTS
- NEW EQUIPMENT AND FACILITIES
- TECHNOLOGICAL INFRASTRUCTURES
- PUBLIC INNOVATIVE ADQUISITIONS



The role of the Public Administrations

FUNDING

There are several programs to incentive through partial funding R & D Projects and related activities.

GOBIERNO DE ESPAÑA — MINISTERIO DE ECONOMÍA, INDUSTRIA Y COMPETITIVIDAD — CDTI Centro para el Desarrollo Tecnológico Industrial

http://www.cdti.es/index.asp?MP=15&MS=642&MN=3&idioma

EUSKO JAURLARITZA GOBIERNO VASCO — EKONOMIAREN GARAPEN ETA LEHIAKORTASUN SAILA — DEPARTAMENTO DE DESARROLLO ECONÓMICO Y COMPETITIVIDAD — GRUPO spri

http://www.euskadi.eus/gobierno-vasco/-/ayuda_subvencion/2018/i+d+i-2018/

ELKARTEK

HAZITEK

INNPRONTA

INNODEMANDA

EEA Grants

FEDER (ERDF) - INNTERCONECTA

CENIT

R+D+i internationalisation

Proyectos estratégicos CIEN

INNOGLOBAL

INNVOLUCRA (Science Industry,…)

…..

Tenerife 2030 — Cabildo de Tenerife — TFinnova — intech Tenerife

http://tenerifeinnova.es/sites/tfinnova/files/tfinnova/ACTU_PD_2016_2021%20-27_09_2016vfinal.pdf

The role of the Public Administrations

Most of the funding programs have in common:

- The projects are selected in a concurrent competition call
- It´s a partial funding, an incentive
- Combine non returnable part with concessional financing
- Promote and give priority at collaborative consortia, with academia and centers of research as partners of the industry
- Most of them ask for financial guaranties for the research period
- There is a general concern about the loss of programs and money devoted to this fundings, because of the economic crisis.

CONCLUSIONS

Collaboration in the field of Science Industry in Spain has many shapes and includes many different agents.

Besides collaboration for developing new products and instruments, scientific infrastructures building-up, specialized education, more efficient use of the facilities, international collaboration, and so on, are also important objectives for collaboration.

There is a Public Administration will to promote and help to support R&D but the quantity of money devoted to it, is perceived as not enough.

In our opinion the future of collaboration in Science Industry should escalate to an international level as fast as possible.

THANKS A LOT FOR YOUR ATTENTION !!

fjcaceres@ineustar.com