Update on IFMIF-DONES

A. Ibarra

Próximas oportunidades para el sector industrial en IFMIF-DONES
video, 18 Mayo 2021
What is IFMIF-DONES?

A fusion-like neutron source required for the qualification of the materials to be used in the EU DEMO.

- Neutron flux of $\sim 10^{14} \text{ cm}^{-2}\text{s}^{-1}$
- Neutron spectrum up to 50 MeV energy
- High Flux Test Module:
  - 20-50 dpa/y at 100 cm$^3$
  - Controlled temperature: $250 \leq T \leq 550 ^\circ \text{C}$
Main involved technologies
- RF
- Cavities
- Magnets
- Mecatronics (Cu, Nb, Al, ...)
- Cryogenics
- Vacuum
- Power supplies
- Cooling technologies
- Diagnostics
- Control (hardware and software)

- 175 MHz, 5MW, 125 mA, CW, high availability: One of the more powerful accelerators in the world
Li systems summary

Main involved technologies
- Liquid metals (fluids, monitoring and purification)
- Complex cooling loops
- Diagnostics
- Remote maintenance
- Control (hardware and software)
Test Systems summary

Main involved technologies
- Mecatronics
- He and water cooling
- He, Ar and water systems
- Shielding materials and technologies
- Remote maintenance
- Vacuum
- Diagnostics
- Control (hardware and software)
Remote Handling System

Main involved technologies
- Special cranes
- Telemanipulators
- RH tools
- Radiation monitoring
The need for a facility of this type was identified long time ago and work has been carried out by using different frameworks.

In the last 15 years, key projects are: IFMIF/EVEDA (included in the BA), WPENS –including specific Industry contract- (EUROfusion WP), DONES-PreP (EURATOM CSA), DONES-PRIME and DONES-UGR (Spanish funded projects), ....
World record achieved in 2019!!!: 125 mA of D+ up to 5 MeV

LIPAc construction for phase B+ completed in March 2020
Broader Approach-Phase II Agreement extended (at least up to 2025)

- IFMIF/EVEDA main objective: LIPAc accelerator operation
- In the next two years it is expected that the Accelerator technology will be fully validated (operation up to full energy, full current)
- To become a test bench to optimize the DONES operation
- Training facility

Main conclusion up to now: design seems feasible
Main objective: To be ready, from the technical point of view, to start the DONES construction phase by the early 20’s

IFMIF-EVEDA validation activities: Orai loop, Heloka, Lifus6, LIPAc

IFMIF-DONES validation activities

Critical technical issues analysis (quench tank location, TA approach, AC configuration,...)

Project timeline

IFMIF EDR 2013

IFMIF-DONES Conceptual Design Report 2014

Reference Design 2016

EU site agreed: Granada End 2017

PEDR (generic) 2017

PEDR (Granada) mid 2019

PSAR-v1 mid 2019

PSAR-v2 mid 2020

PEDR (Granada) end 2020

Plant and systems requirements definition
Design guidelines
Boundaries and interfaces identification
Implementation of design choices
Systems design
Integrated analysis

we are close to the objective!!!
To continue with the IFMIF-DONES design activities:

- Draft specifications for the main building and conventional plant systems contracts ready in 1-2 years
- To develop some key-component prototypes
- To support the (future) Project Team with long-term transversal activities (safety, availability, maintenance, neutronics,…)
- To prepare the operation phase
Main objective:

To prepare a draft agreement on the international implementation of the DONES Facility project
Contributions based on in-kind approach

In order to obtain its contribution, it is important to provide a set of documents, so, the partners get a general view of the Project.

These documents are in the scope of DONES Prep-Phase

WP 5.0 Financial Approach
- 5.1 Cost estimates and cost book
- 5.2 Development of a financial planning
- 5.3 Preliminary financial contributions by the partners
DONES-PRIME and DONES-UGR

- **Main objectives**: to support the proposal to built the facility as soon as possible and to assure a fast start of the project
- **Technical objectives:**
  - Full detailed characterization of the site (geotechnical, seismic, radiological, meteorological,…)
  - Construction of some buildings
  - Initial steps for a Project Office (around 10-12 people in 20-21)
  - Specific training program (around 20-30 people)
  - Construction of some specific prototypes and medium size facilities