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**INTER-REP 68**

## **COVER NOTE**

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| Subject: | The IFMIF-DONES Project and its role in accelerating the deployment of fusion energy- Powerpoint presentation (Research (atomic questions) WP meeting 13.07.2023) |
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# The IFMIF-DONES project and its role in accelerating the deployment of fusion energy

Carlos Hidalgo  
National Fusion Laboratory – CIEMAT

July 13th 2023

**MAKE OUR DREAMS A REALITY**  
**CONTROL THE ENERGY THAT KEEPS THE UNIVERSE ALIVE**

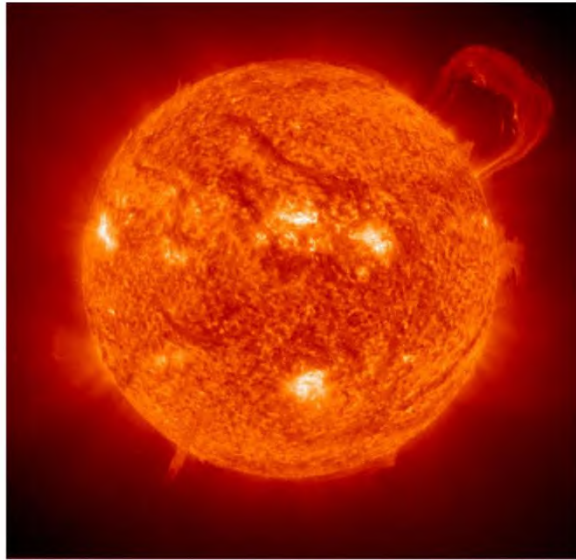
**Spiral Galaxy M51**

150,000 million times the mass of the SUN at 23 light years from earth

**FUSION ENERGY**  
 $E = \Delta m c^2$

Small change in the mass, an amazing release of energy

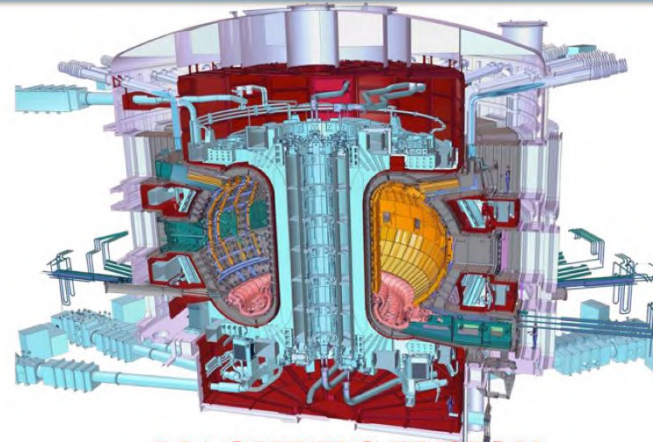
# OUR DREAMS CAME TRUE: FUSION ENERGY ON EARTH



Gravitational Confinement



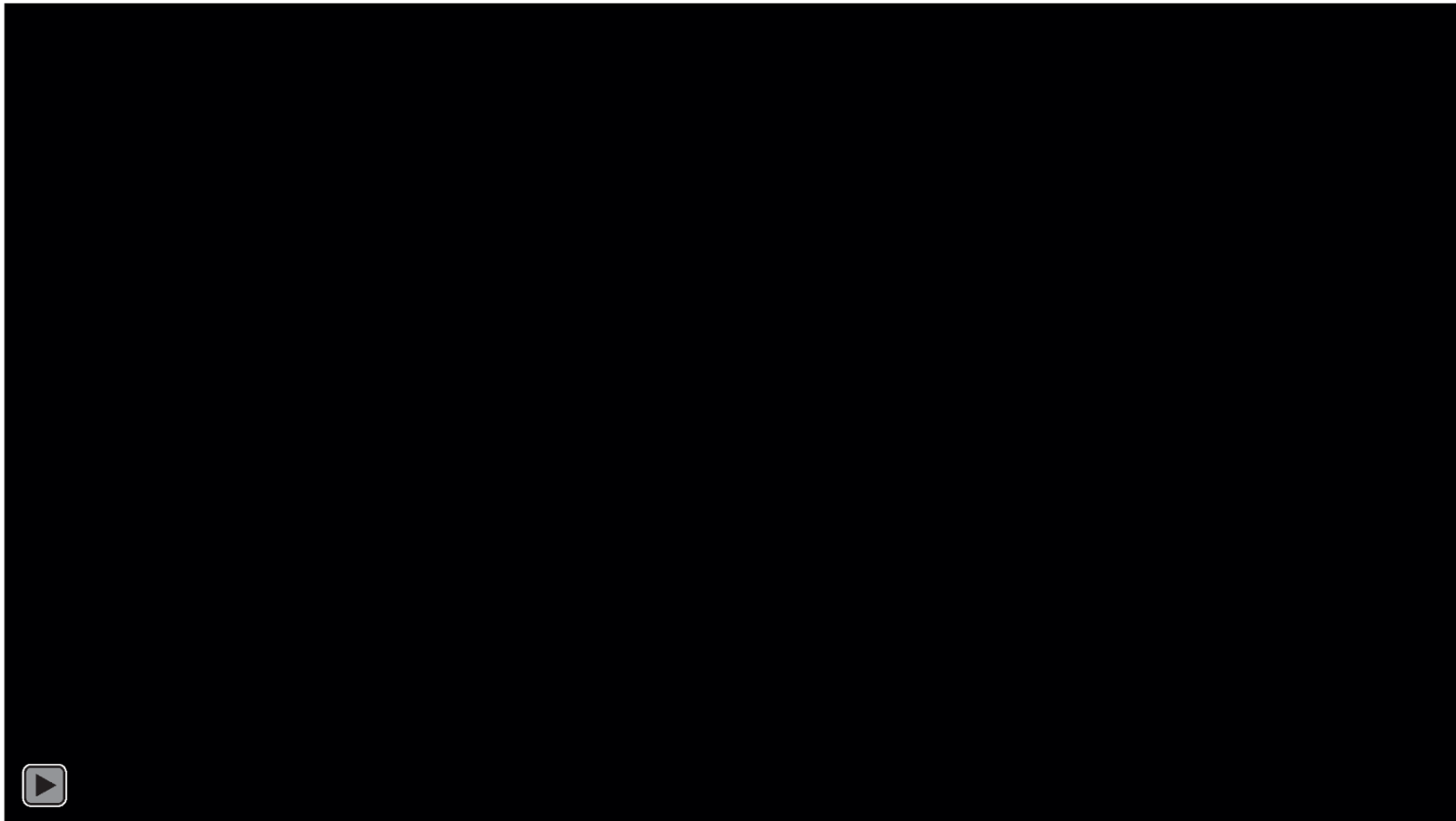
INERTIAL FUSION  
[NIF 2022]



MAGNETIC FUSION  
[JET 2022]

# OUR DREAMS CAME TRUE

Record of magnetic fusion energy [JET, February 2022]





# MAKE OUR DREAMS A REALITY: FUSION ENERGY FOR SOCIETY



## EU Fusion Roadmap (2023)

**PARALLELIZATION** of EU activities for the **ACCELERATION** of DEMO and FUSION POWER PLANTS

# OUR PENDING CHALLENGES

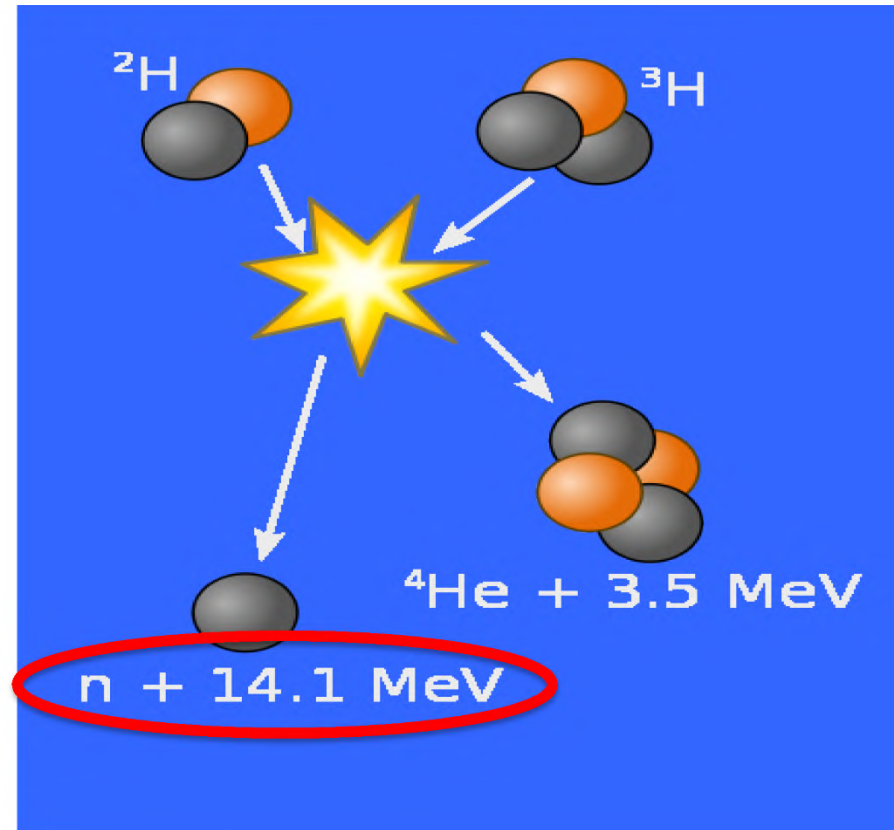
## FUSION ENERGY FOR SOCIETY

VALIDATION OF MATERIALS UNDER NEUTRON IRRADIATION

VALIDATION OF TRITIUM TECHNOLOGIES

VALIDATION OF MATERIALS UNDER HIGH HEAT FLUXES

# VALIDATION OF MATERIALS UNDER NEUTRON IRRADIATION



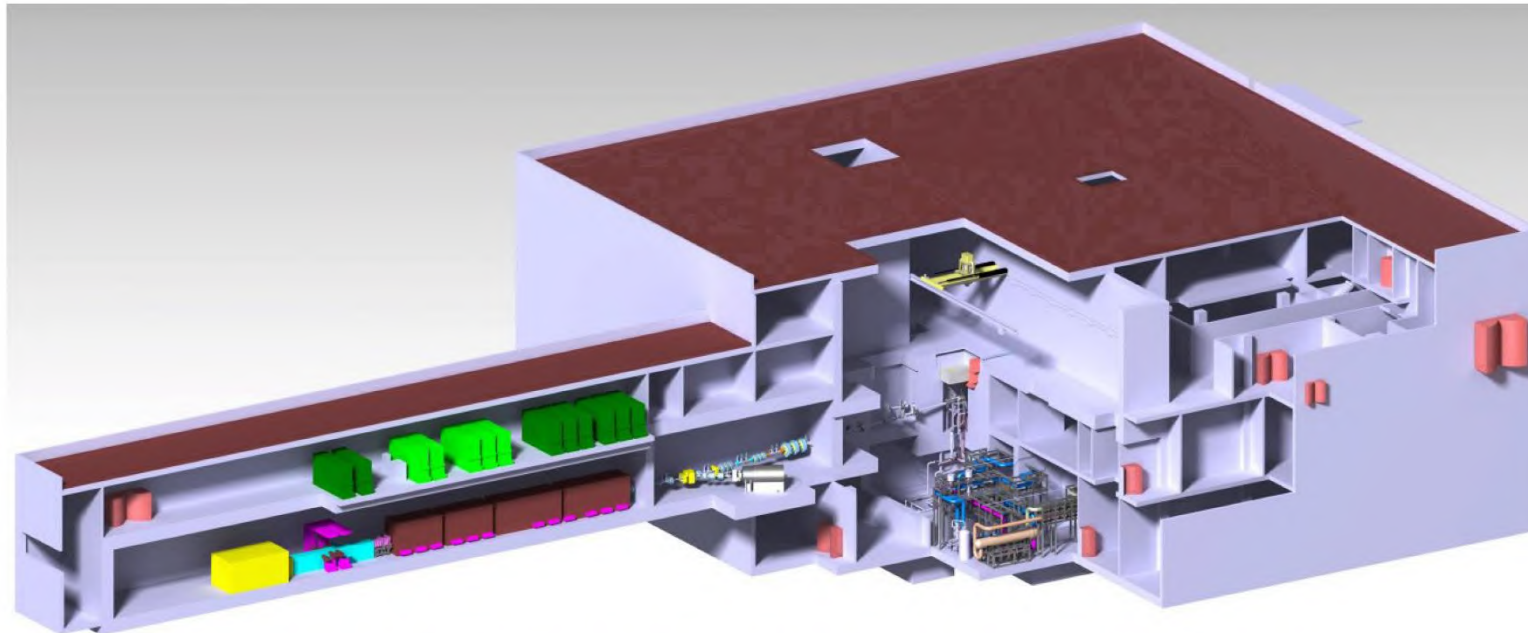


## VALIDATION OF MATERIALS UNDER NEUTRON IRRADIATION: **IFMIF – DONES** [March 2023 / 1<sup>st</sup> Steering Committee]



**DONES: Key ESFRI facility for the deployment of Fusion Energy**  
**[MATERIALS VALIDATION]**

# VALIDATION OF MATERIALS UNDER NEUTRON IRRADIATION: **IFMIF – DONES** [March 2023 / 1<sup>st</sup> Steering Committee]

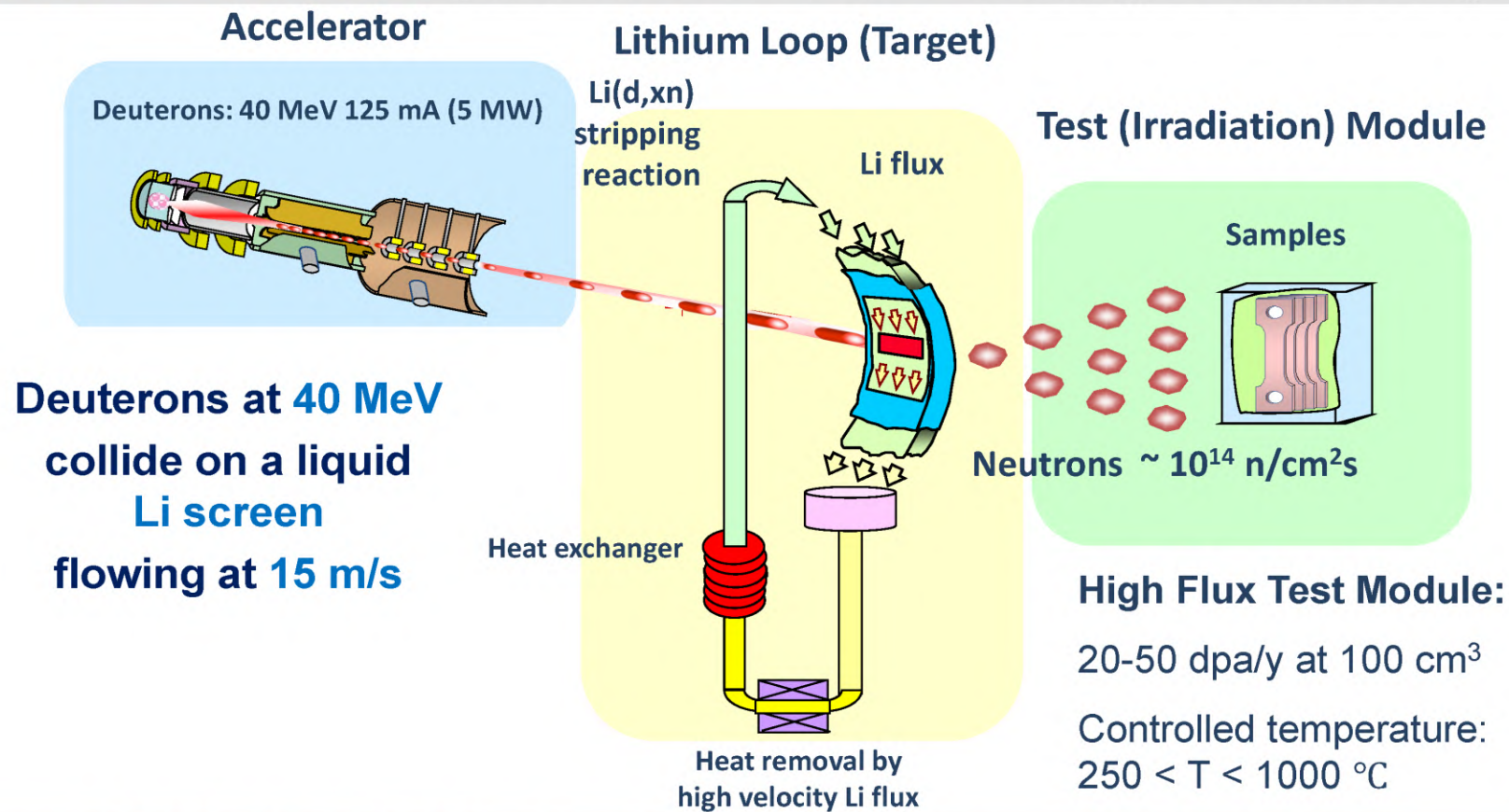


Identified as high priority in the EU Fusion Roadmap  
Included in the ESFRI Roadmap as a EU strategic facility

**DONES: Key ESFRI facility for the deployment of Fusion Energy**  
**[MATERIALS VALIDATION]**



# VALIDATION OF MATERIALS UNDER NEUTRON IRRADIATION: IFMIF – DONES [March 2023 / 1<sup>st</sup> Steering Committee]



**DONES: Key ESFRI facility for the deployment of Fusion Energy**  
**[MATERIALS VALIDATION]**

# **OUR PENDING CHALLENGES**

## **FUSION ENERGY FOR SOCIETY**

**VALIDATION OF MATERIALS UNDER NEUTRON IRRADIATION**

**VALIDATION OF TRITIUM TECHNOLOGIES**

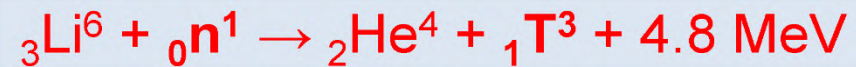
**VALIDATION OF MATERIALS UNDER HIGH HEAT FLUXES**

# VALIDATION OF TRITIUM TECHNOLOGIES

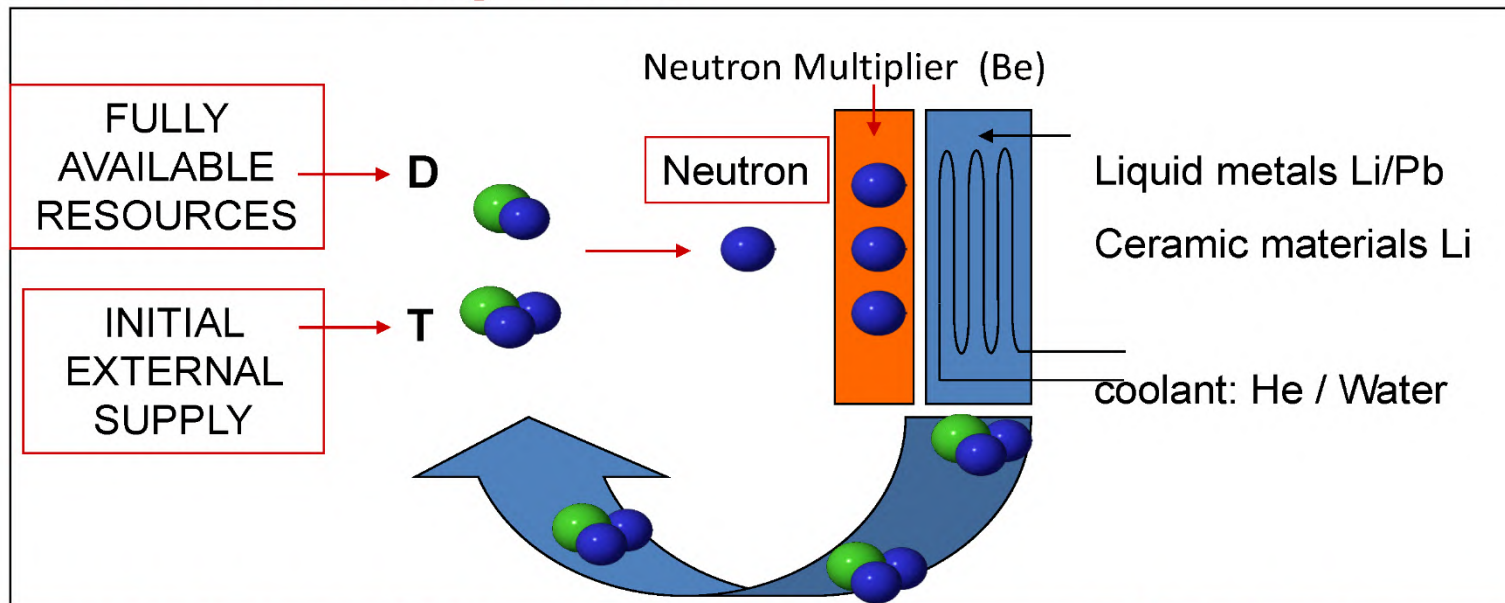




# VALIDATION OF TRITIUM TECHNOLOGIES



## Tritium “breeding blanket”



**DONES: Key ESFRI facility for the deployment of Fusion Energy**  
**[Basic validation of Tritium Technology]**

# **OUR PENDING CHALLENGES**

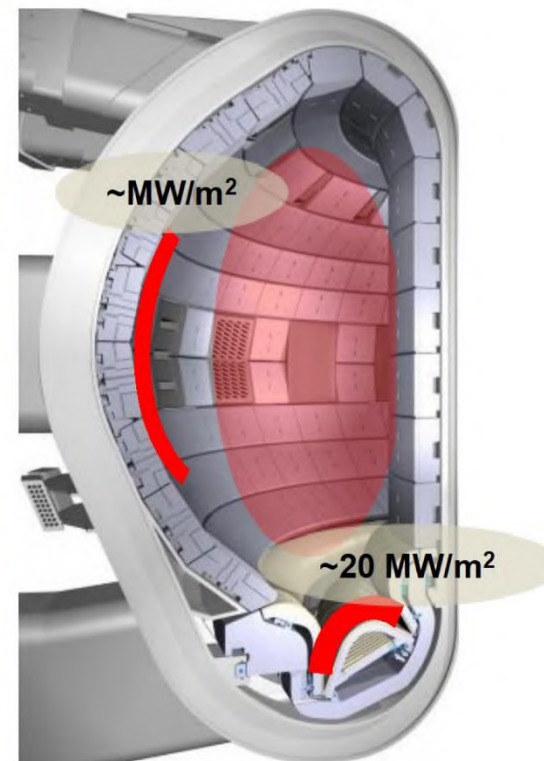
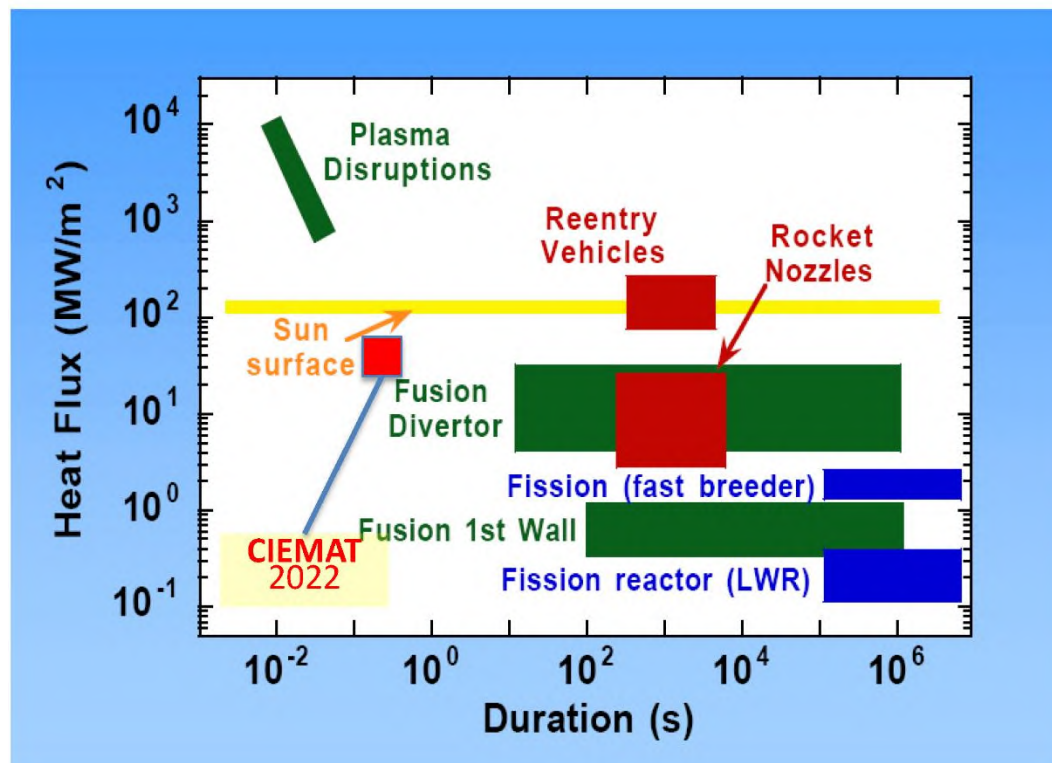
## **FUSION ENERGY FOR SOCIETY**

**VALIDATION OF MATERIALS UNDER NEUTRON IRRADIATION**

**VALIDATION OF TRITIUM TECHNOLOGIES**

**VALIDATION OF MATERIALS UNDER HIGH HEAT FLUXES**

# VALIDATION OF MATERIALS UNDER HIGH HEAT FLUXES

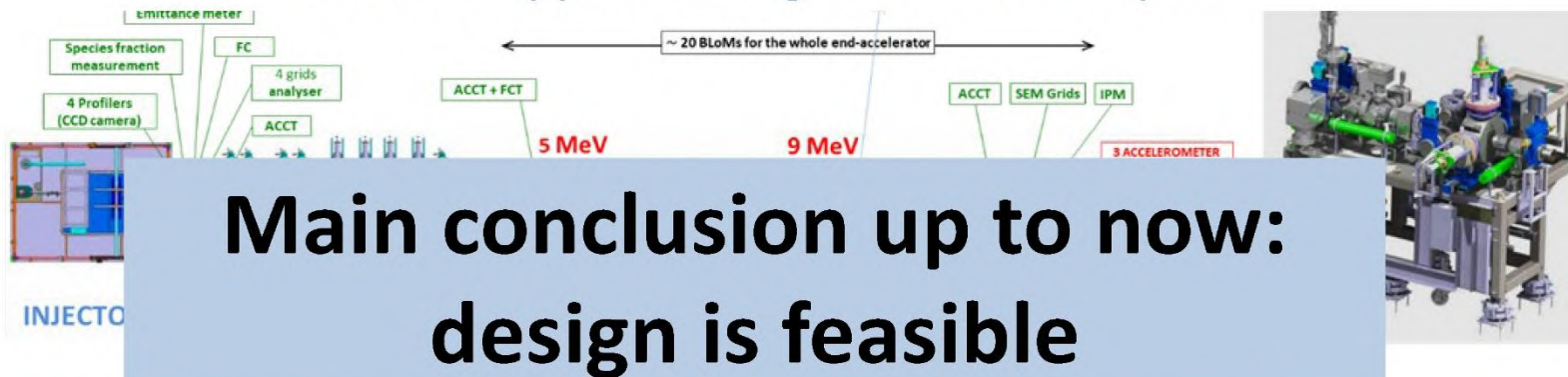


**Advanced materials technology: Behavior of advanced materials in “steady” conditions and energy flows in the range of 10 - 100 MW / m<sup>2</sup>**



# Working towards IFMIF-DONES

Linear IFMIF Prototype Accelerator (LIPAc) in Rokkasho  
“Broader Approach” Agreement EU-Japan



# Working towards IFMIF-DONES

Discussions are presently going on in EU in order to implement acceleration strategies for fusion development.

They can have some impact on DONES future baseline

First materials irradiation  
early 2030

## Sharing Status

### *Agreed:*

- Spain 55%
- Croatia 5%

### *Advanced discussions:*

- F4E 20%
- Slovenia 3%

### *Technical discussions:*

- Japan
- Italy
- Germany

### *Exploratory activities:*

- Poland
- Sweden
- US



# GRAND CHALLENGES IN THE XXI CENTURY: SCIENCE FOR SOCIETY

CLIMATE CHANGE  
AND

ETHICS

UNDERSTANDING

**FUSION ENERGY**  
**GRAND CHALLENGE FOR HUMANITY**

EN  
AND  
DE

**IFMIF-DONES**

**KEY European FACILITY**

**TO MAKE OUR DREAMS A REALITY**

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EFFICIENT  
SOCIETIES

ARTIFICIAL INTELLIGENCE  
AND SOCIETY