1st Fusion Student Challenge

Fusion Student Challenge

Promoved by:

FUSENET

The European Fusion Education Network

Space for companies and other institutions

Overview: 1st Fusion Student Challenge

Accelerating the growth of new Fusioneers and the Fusion industrial sector.

Location: TBD

Extension: Europe (It can be extended to other continents).

Participants: BsC and MsC Students (PhD will be allowed to be directors)

Enhancing synergies between academia and industry

1st Fusion Student Challenge could be organised by the CIEMAT*, Universidad de Granada*, and IFMIF-DONES.*

The Sponsors/Industry could propose a particular challenge

* To be confirm

Values of the Challenge

YOUNGS RESEARCHERS

HANDS ON

MULTIDISCIPLINARY

STRONG RELATIONSHIP ACADEMIA - INDUSTRY

EQUALITY

COMMON BENEFIT

The Team

Participation requirements

Responsible (At least a professor)

Degree and Master's students will be allowed (Not Limit).

Only one PhD member by category (see notes).

Advisors (Not Limit)

Multidisciplinary Team

Science (Physics, Chemistry, Math)*

Engineering (Mechanical, Electrical, Materials)*

Economics*

Marketing*

Architecture

Others

Others

*Mandatory multidisciplinarity

No limit of students

Equality: at least 40% will be women.

What is the challenge about?

Topics to evaluate

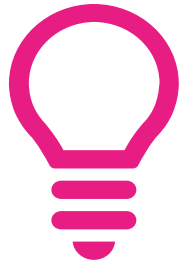
Scientific plan

Technical design

Economic proposal

Scalability idea

Other To be defined



Main areas to cover

Detectors

Simulations (Digital twin)

Management energy consumption

Materials

Tritium production

Antennas RF

More… (to be discuss)

Steps in the challenge?

Duration: (1Year)

Final Event

Conceptual Design

Idea development

Presentation 30 slides

Videoconference defence.

Final Design

Technical report

Only qualified teams will redact the safety procedures design.

Safety Design

Only teams with safety approval will be able to build and test a prototype in experimental fusion reactor

Prototyping Testing

Only 3 teams Will test their design in a real Fusion Reactor.

n teams → 20 teams → 10 teams → 3 teams → **Winners**

2 months | 5 months | 5 months | **Time Schedule**

Challenges (An example)

Design your reactor (Conceptual)

Define properties for Plasma, vacuum, injection, heating, Mechanical, electrical, magnetic, diagnostics, tritium, etc.

Built your own part of the reactor (Prototype)

Built a Detector

Built a coil

Built an injector beam

Digital Twin (Simulation)

Neutronic

Plasma

Materials

Mechanical structure

Power plant energy consumption

Its viable your idea? (Economics Development plan)

Growth

Diversification

Sustainability

Equity

Empowerment

Its Scalable your idea (Architecture design)

Built a scale model of your dream Fusion Reactor Power Plant.

Score:

To be define	Performance /Cost	Match with your twin	Overall cost	Most voted model

Restriction: The Challenge must have some restrictions as:

Materials to use

Size

Budget

Promotion: It Will promote:

Common material database

Use intensive of Artificial Intelligence

Final Event

Month: July-August

Location: Spain *To be confirm

Duration: 3 days

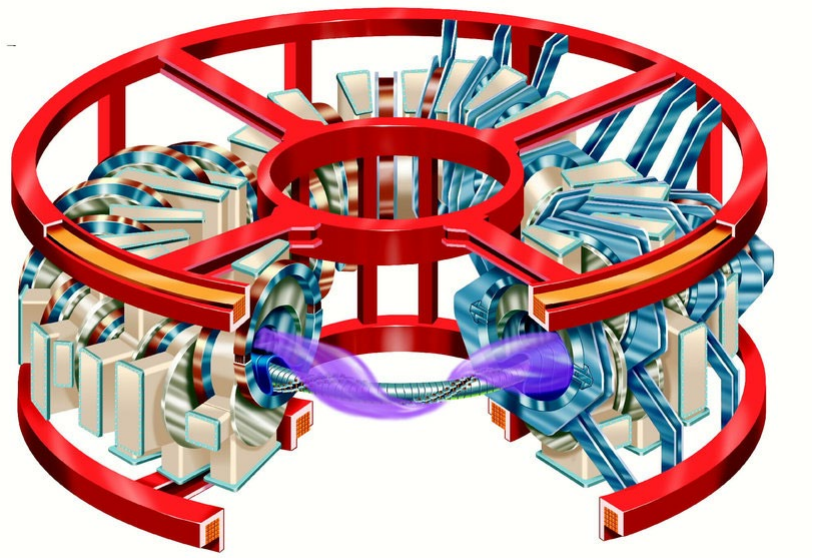
Events:

- Top speakers
- Teams' presentation
- Industry presentation
- Networking
- Scientific tour
- Ceremony Award

Motivation

For the top 3 teams:

Test the prototype in a real experimental fusion reactor*



*TJ-II should be proposed by this 1st challenge

Awards

Examples

- Full-Scale Technical Award
- Digital Twin Award
- Best Prototype Award
- Full-Scale Socio-Economic Award
- Architecture Design Award
- The sponsors could propose and award
  - Other categories to be defined depending on sponsors

Behind the challenge

Synergies

- Companies will be involved in the design and manufacturing process.
- Future academic-industry collaboration can be born.

Fusioneers Skills

- Resilience
- Cooperation
- Sharing the know-how
- Schedule management

Learn Enjoying

- The most powerful tool in teaching is enjoy and fail doing things.

Jury

It will be proposed by the organisation's committee (Volunteers)

Implication:

15 h/year (3 times)

1 Conceptual design

2 Final design

3 Safety design

The jury can be invited to the final event but is not mandatory to participate.

Funding

Each team will pay for its own development.

The objective is to establish and strengthen contact with the local industry.

Each team will pay for the transportation to the event.

Same as Congress, Workshop, Annual meetings where the participants pay by the assistants.

The final event will be covered by the organisation team.

The budget is reasonable.

Offer different levels of Sponsorship for merchandising.

Levels of sponsorship

Premium	• 10.000 € in cash + 5.000 € in gods.
Gold	• 5.000 € in cash + 5.000 € in gods.
Plate	• 2.000 € in cash • 2.000 € in gods.
Bronce	• 1.000 € in cash or gods.
Institucional	• University, Organization of Students, Research Centers

Merchandising

- T-Shirts
- Notepads
- Pencil
- Brochure
  - Sponsors
  - Story
  - Motivation

Diffusion

- FuseNet
- Fusion Research Centres
  - CIEMAT
  - IPP
  - CEA
- Jovenes nucleares
- WEB
- Media
  - Facebook
  - Reddit
  - LinkedIn
  - Email

Other Challenges

European Hyperloop Week	EHW EUROPEAN HYPERLOOP WEEK	https://hyperloopweek.com/
European Rocketry Challenge	EUROC EUROPEAN ROCKETRY CHALLENGE	https://euroc.pt/
Formula Student	FSS FORMULA STUDENT SPAIN	https://www.formulastudent.es/

Data

- A budget of 300k € can be achieved by the teams in other student challenges.
- ~30k € is the budget for the European Hyperloop week and is covered by the university host. (To be confirm)

Clarification

All ideas presented in this document do not represent a real intention of those mentioned. It is simply a proposal that must be evaluated and approved by the respective entities.