Erasmus Mundus Fusion Doctoral College

International Doctoral College in Fusion Science and Engineering Physics (FUSION-DC)

STAFF WEEK: INTERNATIONAL COOPERATION IN DOCTORAL EDUCATION (2 8 – 30 MARCH 2022)

Previous international postgrade experience…

FUSION-EP

Education and Culture DG
Master of Science in Nuclear Fusion and Engineering Physics
Erasmus Mundus

Erasmus Mundus Master Programme

European Master of Science in Nuclear Fusion and Engineering Physics (FUSION-EP)

(http://www.em-master-fusion.org/)

- *first edition: 2006/07 – 2011/12*
- *second edition: 2011/12 – 2016/17*
- *third edition: since 2021/22*

The FUSION-DC Programme

(five cohorts, the first starting in 2012)

FUSION-DC is a three-year **Joint Erasmus Mundus Doctoral Program in nuclear fusion science and engineering** offered by a consortium of **19 European partner institutions** from 8 EU countries (9 full partners and 11 associated), the **ITER Organization and 9 associated partners from China, Japan, Russia and the USA**

FUSION-DC provides a sustainable, integrated and coordinated education at the doctoral level in the framework of a worldwide network of excellence in magnetic confinement fusion (MCF).

The **FUSION-DC** doctoral program involves an attractive variety of educational and training activities and an unsurpassed diversity of research opportunities at the partner institutions and research facilities

FUSION-DC focuses on a number of research fields that address the major remaining challenges for making fusion energy a reality, with an emphasis on next-step devices (ITER, W7-X, DEMO) and reactor aspects

Full (Core) partners

- ***Ghent University, Belgium (coordinator)***
- *Université de Lorraine (France)*
- *Universidad Carlos III de Madrid (Spain)*
- *Universidad Complutense de Madrid (Spain)*
- *Universität Stuttgart (Germany)*
- *Universitá degli Studi di Padova (Italy)*
- *Instituto Superior Técnico Lisboa (Portugal)*
- *Max-Planck-Institut für Plasmaphysik, Garching and Greifswald (Germany)*
- *IRFM, EURATOM-Association.CEA (France)*

EU Associated Partners

- *FOM Institute for Plasma Physics, TEC member Rijnhuizen (Netherlands)*
- *Forschungszentrum Jülich (Germany)*
- *ITER Organization (Cadarache; France)*
- *CIEMAT (Madrid, Spain)*
- *Fusion for Energy*
- *Institute of Plasma Physics, Prague v.v.i. Acad. of Sci. of the CZ.Republic*
- *Université de Provence Aix- Marseille I (France)*
- *Technische Universiteit Eindhoven (Netherlands)*
- *Université Libre de Bruxelles (Belgium)*
- *Ludwigs-Maximilians-Universität München (Germany)*
- *FUSENET Association*

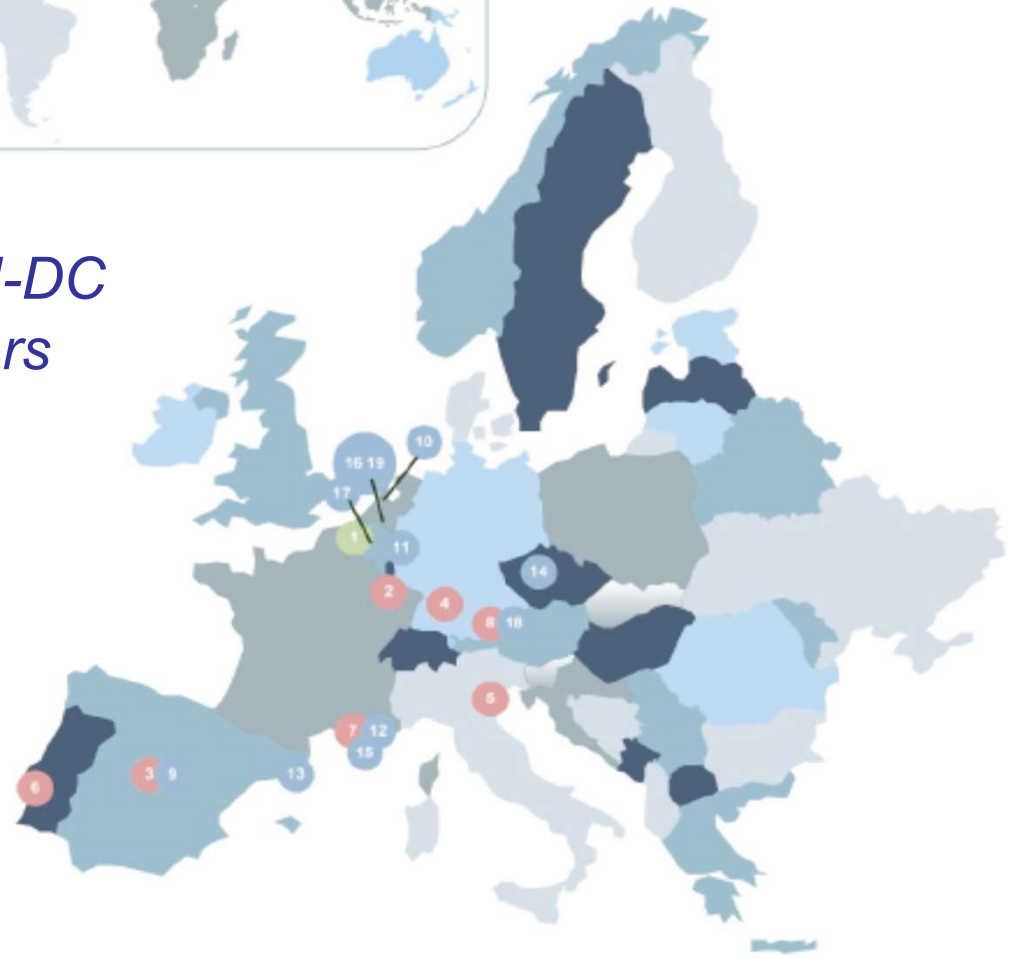
- ***FUSENET*** *(Fusion Education Network: http://www.fusenet.eu/)*

FUSENET is an educational european network created with the aim of promoting a structured education and training at european level within the field of nuclear fusion

Non-EU Associated partners (China, Japan, Russia, USA)
(important for attracting good students outside EU)

- *University of California Los Angeles (USA)*
- *University of California San Diego (USA)*
- *The University of Wisconsin-Madison (USA)*
- *St. Petersburg State Polytechnic University (Russian Federation)*
- *National Research Nuclear University (Russian Federation)*
- *Tsinghua University (China)*
- *Southwestern Institute of Physics (China)*
- *University of Science and Technology of China*
- *Kyushu University (Japan)*

FUSION-DC partners



Research fields

FUSION-DC focuses on six physics and engineering fields:

F1. Tokamak physics for ITER and beyond
F2. Technology for ITER and beyond
F3. Stellarator and reversed field pinch research and advanced concepts
F4. Plasma-wall interaction and materials research
F5. Plasma theory and computational plasma physics
F6. Diagnostics, plasma control and data analysis

Application and selection

Doctoral Candidates are selected according to doctoral thesis topics offered by FUSION-DC

Doctoral thesis topics have to fit at least one of the six research fields, and are published on the **FUSION-DC** website at least three months before the Candidates selection

The Steering Committee (SC) aims at selecting every year roughly 16 Doctoral Candidates, about half of which will receive an Erasmus Mundus fellowship

Student categories

- 8 EU fellowships during 36 months (*Erasmus Mundus Doctoral students*)

- 8 *'nationally funded'* students who are accepted by the Consortium and for whom specific financial support will be available through regular national channels

Supervision procedure

FUSION-DC Doctoral Candidates are carrying out their research activities in the framework of a Joint Doctorate implemented through ***Co-tutelle***

A ***Co-tutelle Agreement*** is made up between the academic full Partners of the specific Doctorate topic and the Candidate

Doctoral thesis topics are submitted to the Steering Committee by at least two member institutions of the **FUSION-DC** network

One of them must be a full Partner and will be the ***home institution*** of the Doctoral Candidate. This is the institution where the PhD candidate will stay most of the time. The home institution is responsible for the employment contract and provides the Candidate promoter

The second partner institution is called the ***host institution***. It can be an Associated Member. The PhD Candidate will spend at least six months in the host institution. There may be several *host institutions* for each PhD Candidate

Each Doctoral Candidate is under the supervision of the ***Doctoral Guidance Committee*** appointed by the Steering Committee and composed of the promoter, the co-promoter, one or more mentors (if applicable) and one or two experts from external institutions where the work is done

FUSION-DC doctoral programme

All **FUSION-DC** Doctoral Candidates have to follow and complete the **FUSION-DC** Doctoral programme set in the co-tutelle agreement

In particular, they must comply with the following general requirements:

- Undertake a specific academic training corresponding to at least 18 ECTS (6 ECTS in transferable skills and 12 ECTS in specialized research related training);

- Attend at least two international conferences or workshops with oral or poster presentation

- Have at least one paper as first author published or accepted in a refereed scientific journal;

- Attend two annual PhD meetings (*Phd events*) during the doctoral thesis period. These PhD meetings will be organised in accordance with the FUSENET regulations

Diploma: Joint or Double degree

The PhD diploma will be awarded by the two respective supervising universities to the **FUSION-DC** PhD Candidates after successful defence of their PhD thesis

This will be a ***joint***, a ***double*** or a multiple degree depending on the commitment and national legislation of the diploma awarding universities

In practice, ***double diplomas*** have been awarded in most cases

In addition to the diploma, *a* ***FUSION-DC joint doctoral training programme certificate*** is awarded to all **FUSION-DC** Doctoral Candidates successfully completing the programme. It is awarded jointly by all the full partner universities, and it is issued by the coordinating institution Ghent University

Administrative organization of FUSION-DC

The **FUSION-DC** management structure consists of:

- ***Steering Committee*:** The *Steering Committee* is the board in charge of major decisions related to the ***FUSION-DC*** *Joint Doctoral Training Programme*. It includes a representative of each of the full parners

- ***Scientific Board:*** The *scientific Board* advises and assists the *Steering Committee* and safeguards the academic quality of the overall doctoral programme

- ***Strategic Advisory Board***: The *Strategic Advisory Board* establishes and maintains the links between **FUSION-DC** and industry

- ***Central Secretariat***