TCP on Nuclear Technology of Fusion Reactors (NTFR TCP)

The NTFR TCP is a collaborative programme on the research and development of nuclear technology of fusion reactors, a priority area for fusion energy. The TCP focuses on technologies of components located close to the fusion plasma and subjected to high-energy neutron irradiation, in particular tritium production and processing, energy extraction, radiation shielding and components such as the first wall, blanket, shield and plasma facing components.

Main areas of work

Work is structured in 2 main tasks ('annexes'):

- Annex 1 addresses the characterisation of blanket: tritium breeding blankets, radiation shielding and tritium processing systems
- Annex 2 addresses the characterisation of tungsten as a plasma-facing material

Key activities and accomplishments (2017-2018)

- 74 publications in peer-reviewed journals
- MaPLE-U facility at UCLA (USA) fully operational after major upgrades by a US and EU joint team
- Design activities on several devices; development of codes and nuclear libraries; nuclear analyses and model developments for ITER, the DTT, MAST, DEMO and HELIAS
- R&D in support of ITER and DEMO tritium systems
- Testing of plasma Facing Components in support of ITER

Tungsten tiles of different shapes for the study of tritium (Source: NFRI, Korea)

Experimental set-up for the study of tritium permeation barriers (Source: CIEMAT, Spain)

Priorities and projects (2019 – 2020)

- Launch of co-permeation experiments (solid breeder blankets)
- Testing in upgraded MaPLE-U facility
- Continue activities on neutronics experiments, code development, nuclear data and design analysis
- Continue studies and R&D on a tritium permeation barrier and tritium breeder materials
- Assessment of fuel retention in PFCs and material behaviour under plasma exposure

Multilateral collaborations

- The work programme of the NTFR TCP is closely linked to that of the TCP on Fusion Materials (FM TCP) and the TCP on Environmental, Safety and Economic Aspects of Fusion Power (ESEFP TCP).
- Results of the NTFR TCP are distributed to representatives of countries and fusion energy experts through the annual report, at international conferences and in scientific publications. Some workshops are open also to researchers from countries not signatory to this TCP.

Fusion Power

Membership

Why should your organisation become a member of the NTFR TCP?

The NTFR TCP provides a unique framework for co-ordinating and collaborating international research and development activities in fusion nuclear technologies that will be essential for the successful realisation of fusion as an energy source. Most activities undertaken under the framework of the NTFR TCP are of direct relevance to ITER.

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