Ingegneria dei sistemi elettrici
Electric systems

DII research group
Gruppo per ricerche sulla fusione


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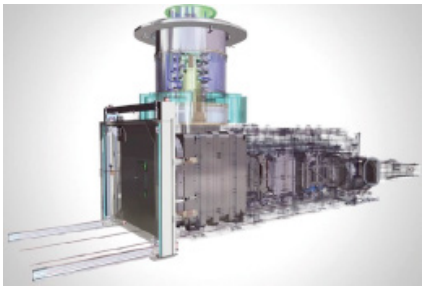
The research is carried out within the framework of the European Fusion Programme, in collaboration with Consorzio RFX (partners: ENEA, CNR, INFN, Università degli Studi di Padova, Acciaierie Venete SpA).

Main research topics:

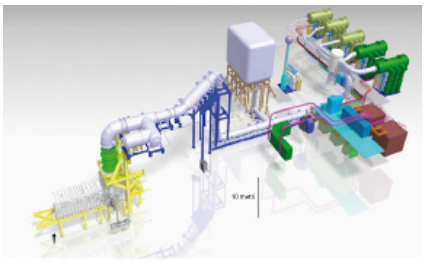
- Fusion science and technology
- Power technology and supplies for fusion
- Neutral beam injection system for plasma heating
- Realization and operation of large fusion devices

Multiconductor 1 MV DC transmission line for large current accelerators

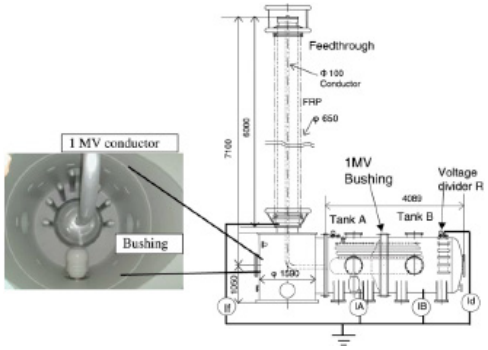
Multiconductors have been "miniaturized" in order to be the smallest conductors (five times smaller than the conductors currently used in high voltage transmission pipelines) able to feed the neutral beam injectors in ITER up to 1MV. The high voltage power supplies for the neutral beam injector involve highly innovative techniques, under development by researchers of Consorzio RFX (in which the University of Padova is involved through the Centro Ricerche Fusione) in collaboration with Japanese colleagues from the Japan Atomic Energy Agency (JAEA); the main components are being manufactured by Hitachi, Japan.
The power supplies of the Neutral Beam Test Facility will include 5 large insulation trasformers, a multiconductor transmission line and the bushing which will connect the line to the beam source and accelerator. Electric power with five different potentials from ground up to 1 MV DC will be conveyed through the line. These voltages will be used to accelerate a beam of hydrogen and deuterium negative ions that, after neutralization, will be injected into ITER tokamak plasma in the form of 1 MeV neutral particles. The injected power will be up to 17 MW for one hour.



The injector in the picture will be used in ITER to "fire" high energy neutral particles, directly into the plasma, where, by means of collisions, they will transfer their energy to the plasma particles.



The injector will heat the ITER plasma to allow the reactor reaching conditions suitable for fusion reactions to occur



CAD scheme of the power supplies of MITICA, the neutral beam accelerator prototype