

A new EUROfusion Facility

At its meeting of the 23-24 September 2014, the General Assembly of EUROfusion integrated the WEST Facility into its ITER Physics Programme. WEST is now part of the EUROfusion Work plan 2015.

Following the recommendations of an international panel of scientific experts gathered by EUROfusion, WEST activities are grouped together within the Work Package Plasma Facing Components (WP-PFC) which was originally dedicated to the high flux and linear plasma generator devices.

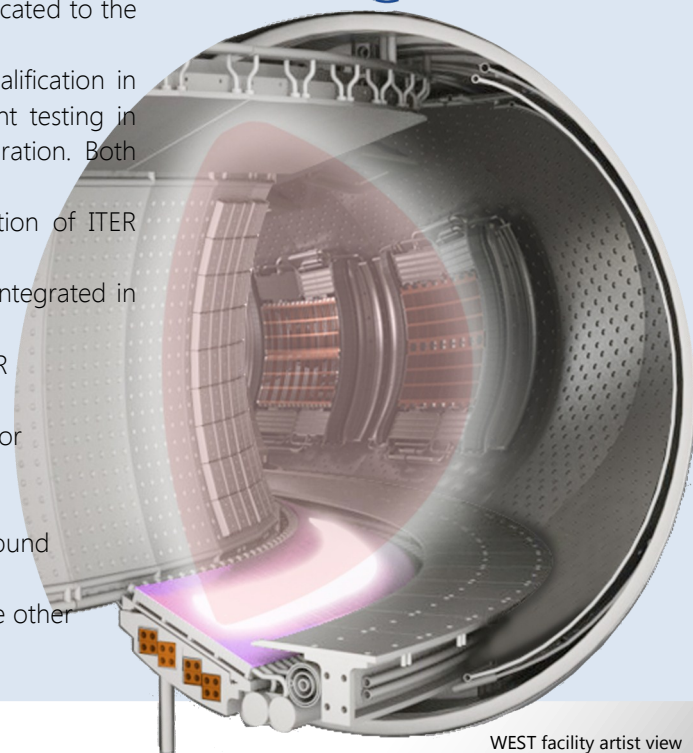
The first activity naturally deals with bulk and coated tungsten PFC qualification in high heat flux facilities and linear machines in view of their subsequent testing in WEST tokamak environment for studying the impact on tokamak operation. Both coatings on Cu and on graphite will be considered.

The second activity is devoted to divertor modelling for the preparation of ITER monoblocks testing in WEST tokamak environment.

Finally the ongoing development on three key PFC diagnostics will be integrated in the EUROfusion Work Plan 2015 as three new activities:

- "Infrared diagnostics": development of high resolution (sub-millimeter) IR system for monitoring PFC surface temperature,
- "Edge Spectroscopy": development of visible spectroscopic diagnostics for monitoring PFC tungsten sources and D recycling,
- "Langmuir Probes": development of actively cooled Langmuir probes embedded in divertor ITER-like targets to measure plasma parameters around the divertor strike points.

From the start of WEST operation in 2016, WEST will be accessible like the other EUROfusion medium size tokamaks: ASDEX Upgrade, MAST and TCV.



WEST facility artist view

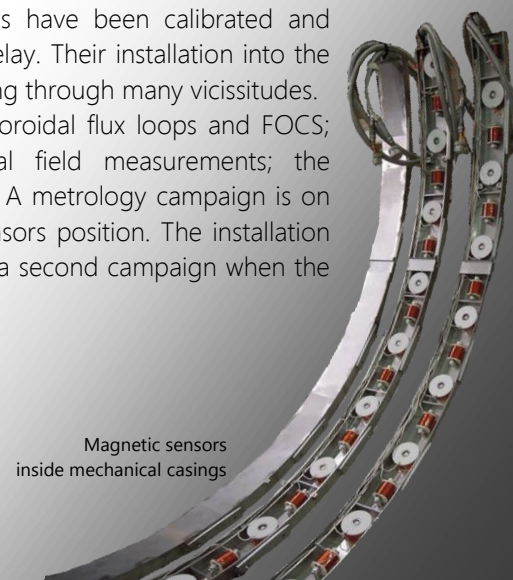
First round for the magnetic diagnostics

The first milestone of the assembly sequence is being reached !

The WEST magnetic diagnostics consist in 480 sensors: mainly pick up coils and flux loops and fiber optic current sensors (FOCS). To ensure the accurate positioning and the protection of the sensors, all of them are installed in mechanical casings which are fixed afterward inside the vacuum vessel. The whole set of sensors and mechanical casings have been calibrated and delivered last December with a two months delay. Their installation into the vacuum vessel is almost completed, after passing through many vicissitudes. This installation concerns the main chamber toroidal flux loops and FOCS; the Low Field Side normal and tangential field measurements; the diamagnetic flux loops and toroidal field coils. A metrology campaign is on going to ensure precise knowledge of the sensors position. The installation of the remaining sensors will be performed in a second campaign when the divertor will be installed inside the vessel.



Philippe Moreau,
Measurement & control Project Leader,
inside the vacuum vessel



Magnetic sensors
inside mechanical casings

The WEST inspection robot has its first look inside EAST Tokamak

Waiting for plasma in WEST, the CEA Articulated Inspection Arm (AIA) reached an important milestone in the demonstration of deployments inside the Chinese Tokamak EAST. The collaboration will continue with the preparation of the robot for its first operational phase in EAST.

The AIA robot is being commissioned in the Hefei laboratory. It will be operated in EAST during WEST construction phase. Such a robot can operate under high vacuum and temperature conditions (120° C). It will ease fast inspection, from EAST to WEST, inside the vacuum vessels and will provide live views of the ITER like Tungsten monobloc components.

In 2013-2014, an improvement and reliability program of the robot was carried out. The robot was transferred to China in July 2014 accompanied by the CEA technical responsible. With the Chinese team he prepared the cask for the integration in EAST Tokamak

The first AIA demonstration in the machine was performed on the 30th of November, during EAST maintenance phase. The AIA was deployed under ambient conditions, using a new supervisor software with real time collision avoidance mode.

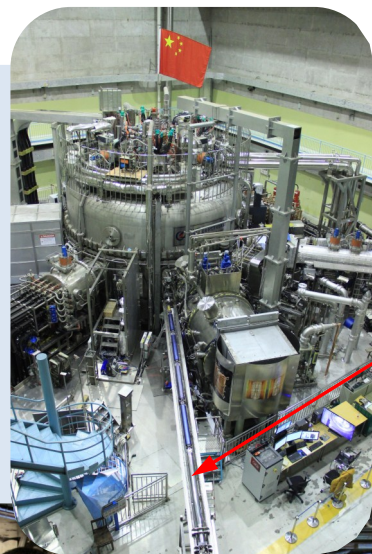
This deployment represents an important milestone for the integration and the use of the robot as a diagnostic. The routine mode is foreseen in the coming months. The robot will return to IRFM for its integration on WEST in 2016.

In parallel with the operation of the robot a joint development programme aims to improve the characteristics of the robot (accuracy, payload, and dexterity) and to create a family of diagnostics (gripper, high performance camera, leak detection systems...).

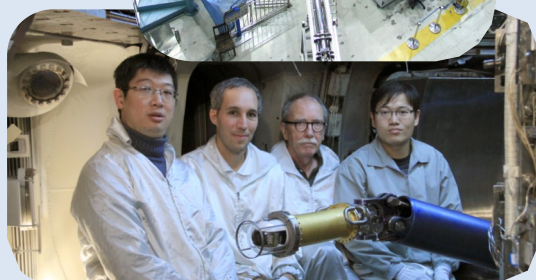
WEST LHCD system: reshaping of the Tore Supra launchers

The two reshaped Tore Supra launchers, powered by 16 new klystrons, will provide 7 MW/CW to the plasma.

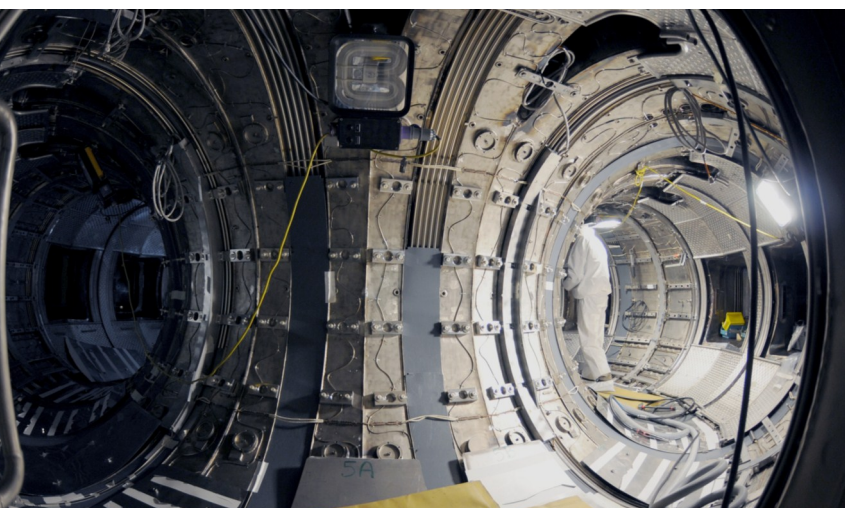
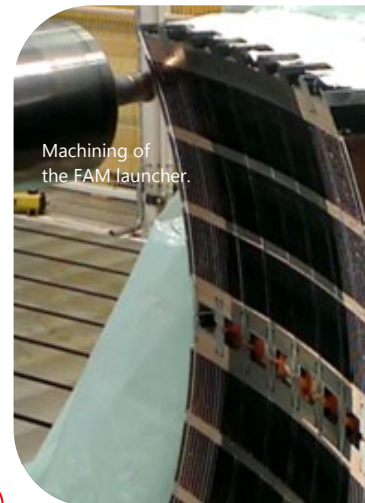
To fit the new plasma shape, the launchers will operate more inward in the vacuum vessel. Consequently the toroidal radius of their plasma facing mouth will no longer be adapted to the magnetic field lines. It was demonstrated that, for the Full Active Multijunction (FAM) launcher in contrary to the Passive Active Multijunction (PAM) launcher, the coupling efficiency will then be strongly decreased. To recover the coupling, the mismatch between the FAM launcher front face and the magnetic field lines has been reduced by modifying its toroidal radius from 1700 to 2300 mm. In addition, the radius of curvature of the waveguide septa of both launchers has been increased to minimize the excitation of suprathermal electrons which induce localized power loads on the plasma facing components. This work has been done by the CNIM company.



AIA cask plugged to the EAST tokamak.

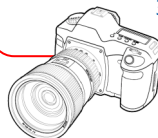


Inside EAST (China) from left to right: Yong Cheng, Vincent Bruno, Eric Villedieu, Hansheng Feng, standing behind the AIA.



PICTURE OF THE DAY

Inside WEST Vacuum Vessel
30 January 2015



Initially scheduled in February,
the 2nd Governing Board will be held
on Thursday, 05th March 2015,
in Cadarache castle