Contribution ID: **136** Type: **Poster**

An overview of the conceptual design of the plasma-facing components of the DTT divertor

Tuesday, 8 November 2022 17:30 (20 minutes)

The Divertor Tokamak Test facility (DTT) [1] is a fusion device currently under construction in ENEA Frascati. Its main scientific goal is to investigate advanced solutions for the heat exhaust in future fusion power plants, such as DEMO. A key step in the success of DTT is the development of integrated plasma scenarios where good core performance is achieved together with acceptable conditions at the wall. For this reason, a substantial number of different magnetic configurations are meant to be tested in DTT. Such a flexibility requirement is the central drive of the design of the first DTT divertor, which must accommodate a multitude of strike points, generally located at various positions accordingly to all the equilibria. Moreover, a proper length of the divertor legs must be ensured to provide both a significant divertor volume to increase the radiated power at the edge, and additional spreading of the energy due to the turbulence transport below the X-point. Such high level of flexibility makes the design of the DTT divertor a first of its kind.
In this contribution, we present an overview of the conceptual design of the plasma-facing components of the first DTT divertor. The poloidal profile of the divertor has been chosen to accommodate the following magnetic configurations (in order of priority): Single Null, X-Divertor (XD), Negative Triangluarity and Snowflake divertor. The plethora of possibilities lead to a wide divertor design, which provides a substantial volume and can host different shapes of divertor legs. The Plasma Facing Units (PFUs) of the divertor are virtually entirely covered by tungsten monoblocks, to allow for different locations of the strike points, while whitstanding steady state heat loads up to 20 MWm-2. Each PFU is made of three segments, Inner Vertical Target, Dome and Outer Vertical Target, connected hydraulically in series, resulting in a single unit connecting the high field side to the low field side. The use of shielding plates are avoided by ensuring, through proper design of the central PFU segment, that the inlet/outlet naked pipes are in the magnetic shadow of the Dome. The Dome, which acts in all respects as a target, is flat in order to minimize its height, thus allowing a longer leg for the equilibria having the outer strike point impinging on it (e.g., the XD). The technology chosen for the PFU manufacturing is the one developed in the ENEA laboratories and qualified for the fabrication of the ITER Inner Vertical Targets. The main results from numerical computation will be reported, mainly concerning the structural and hydraulic verification of the assembly.
[1] G. M. Polli, "Divertor Tokamak Testing Facility (DTT): A Test Facility for the Fusion Power Plant", (2021) Offshore Mediterranean Conference and Exhibition, 978-88946678-0-6

Speaker's Affiliation

University of Rome "Tor Vergata"

Member State or IGO

Italy

Primary authors: DOSE, Giacomo (University of Rome "Tor Vergata"); ROCCELLA, Selanna (ENEA); INNOCENTE, Paolo (Consorzio RFX - CNR); Mr GIORGETTI, Francesco (Department of Fusion and Nuclear Safety Technology); MARZULLO, Domenico; AMBROSINO, roberto (university of Naples Federico II); CRISANTI, Flavio (University of Tuscia); DALLA PALMA, Mauro (Consorzio RFX); DAY, Christian (Karlsruhe Institute of Technology); IMBRIANI, Vito; Mr PIZZUTO, Aldo (DTT); Mr POLLI, Gian Mario (ENEA, Department of Fusion and Nuclear Safety Technology); RAMOGIDA, Giuseppe (ENEA); Mr REALE, Andrea (ENEA, Department of Fusion and Nuclear Safety Technology); NEU, Rudolf (Max-Planck-Insitut für Plasmaphysik)

Presenter: DOSE, Giacomo (University of Rome "Tor Vergata")

Session Classification: Poster Session II (all tracks)

Track Classification: Poster