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Progress in the ITER Neutral Beam Test Facility

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The ITER Heating Neutral Beam (HNB) injectors, one of the tools necessary both to achieve burning conditions and to control plasma instabilities, are characterized by such demanding parameters as to require the construction of a test facility dedicated to their development and optimization.
This facility, called NBTF, is in an advanced state of realization in Padua (Italy), with the direct contribution of the Italian government, through the Consorzio RFX as the host entity, IO, the in kind contributions of three DA's (F4E, JADA, INDA) and the technical and scientific support of various European laboratories and universities.
The NBTF hosts two experiments: SPIDER and MITICA. The former is devoted to the optimization of the HNB and DNB ion sources and to the achievement of the required source performances. It is based on the RF negative Ion Source concept developed at IPP (Garching). MITICA is the full size prototype of the ITER HNB, with an ion source identical to the one used in SPIDER.
The construction and installation of SPIDER plant systems was successfully completed with their integration into the facility, followed by integrated commissioning with control (CODAS), protection and safety systems. The mechanical components of the ion source have been installed inside the vessel and connected to the plants. Finally, the integrated commissioning of the whole system ended positively and the first experimental phase began.
Also the realization of the MITICA project is well advanced, although the completion of the system and its entry into operation is expected in 2022 due to the long procurement times of the in-vessel mechanical components. In particular, the power supply designed to operate at 1MV are in an advanced phase of realization, all the high voltage components have been installed and the complex insulation test phase has begun in 2018. Furthermore, all the other auxiliary plant systems are being installed and / or undergoing testing.
This paper gives an overview of the progress of the NBTF realization with particular emphasis on issues discovered during this phase of activities and to the adopted solutions in order to minimize the impact on the schedule while maintaining the goals of the facilities.
Finally, the first results obtained with SPIDER experimentation and with the 1MV insulation tests on the MITICA HV components will be presented.

Country or International Organization

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