Contribution ID: **24** Type: **Oral**

As built design of the control systems of the ITER full-size beam source SPIDER in the Neutral Beam Tests Facility

Monday, 5 July 2021 14:30 (10 minutes)

SPIDER - the ITER full-size beam source built at the Neutral Beam Test Facility (NBTF) in Padova, Italy –has been in operation since June 2018. SPIDER's mission is to optimize the operation of the beam source so that to reuse the SPIDER experience on the full-size prototype of the ITER Neutral Beam Injector, called MITICA, under advanced construction at the NBTF, and in the ITER heating neutral beam injectors.
The exploitation of SPIDER started with short, low-performance pulses lasting up to a few seconds and developed to obtain long pulses lasting up to 3000 seconds. Furthermore, the integration of plant and diagnostic systems has grown over time. The size of the amount of data collected and stored per pulse can provide a simple measure of evolution. In fact, it has gone from a few tens of Mbytes in the first campaign pulses to the current maximum value of over 150 Gbytes, most of which produced by infrared and visible cameras.
From the first operation onwards, the control systems have also evolved and consolidated, including components and functions, which were not initially foreseen or developed only in a preliminary form. This includes the progressive integration of plant and diagnostic systems and of protection and safety functions.
The paper initially focuses on the architecture of the SPIDER control systems that include CODAS, the system delivering conventional control and data acquisition and management, the central interlock system delivering plant protection, and the central safety system delivering people and environment safety. Since all systems have been developed following the guidelines of ITER for the implementation of control systems, the integrated SPIDER control, interlock and safety systems may provide an interesting example for the ITER plant system developers.
The paper then describes how the top-down definition and implementation of operating states and operational scenarios provide the framework for the integration of control, interlock and safety systems and the basic element for successful operation.
Finally, the paper reports on the lesson learned during these nearly three years of operation with particular attention to the progressive, continuous evolution and recommissioning of systems.

Member State or IGO

Italy

Speaker's Affiliation

Consorzio RFX and CNR-ISTP, Padova, Italy

Primary author: LUCHETTA, Adriano (Consorzio RFX & Consiglio Nazionale delle Ricerche)

Co-authors: Mr TALIERCIO, Cesare (Consorzio RFX and CNR-ISTP); Dr CRUZ, Nuno (Consorzio RFX and Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Universidade de Lisboa, 1049-001 Lisboa, Portugal); Mr MARTINI, Giulio (Consorzio RFX); Mr MANDUCHI, Gabriele (Consorzio RFX and CNR-ISTP); Dr RIGONI, Andrea (Consorzio RFX); Mr TREVISAN, Luca (Consorzio RFX); Dr PAOLUCCI, Francesco (Fusion for Energy); Dr LABATE, Carmelo Vincenzo (Fusion for Energy)

Presenter: Mr TALIERCIO, Cesare (Consorzio RFX and CNR-ISTP)

Session Classification: Machine Control 1

Track Classification: Machine Control, Monitoring, Safety and Remote Manipulation