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SPIDER Integrated Commissioning

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The construction of SPIDER, the prototype of the full-size, radio frequency, negative ion source of the ITER Heating Neutral Beam Injectors, has been completed at the Neutral Beam Test Facility in Padova (Italy). All SPIDER components have been delivered and have successfully undergone the site acceptance tests.

The mechanical components (vessel, ion source, accelerator, and calorimeter), power supply systems, auxiliary systems (gas and vacuum and cooling), basic diagnostics (thermocouples and imaging), control and interlock systems are being prepared for the operation by means of a step-by-step procedure, referred to as integrated commissioning, aiming to progressively achieve the coordinated interoperation of all SPIDER plant systems.

The execution of the integrated commissioning requires a well-defined organization covering personnel safety, shift-based operation, definition of roles and their interaction.

The path to achieve full integration comprises a sequence of activities including:

- One-to-one plant system integration with the control and central interlock systems;
- Functional operation of power supply systems with the control and central interlock systems;
- Insulation and thermal tests of the transmission line and power supply systems;
- Functional operation of the auxiliary systems with the control and central interlock systems;
- Functional integrated operation of power supply and cooling systems;
- Performance tests.

The paper, after briefly summarizing the status of the SPIDER experiment, will initially focus on the organization of the integrated commissioning. The execution of the commissioning campaigns will then be presented along with the technical and scientific issues encountered and the solutions applied to solve problems. Finally, the paper will discuss the transition from the SPIDER integrated commissioning to the SPIDER operation.

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