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P4.023 The fabrication and assembly of the beam source for the SPIDER experiment

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The ITER Heating Neutral Beam injector will be equipped with a beam source that will provide a negative beam of 40A (H₂ or D₂). The R&D activities undertaken in Europe to pursue this challenging goal comprise three experiments:

- ☒ ELISE the half size ion source experiment operating in IPP Garching
- ☒ SPIDER the full size ion source experiment at Neutral Beam Test Facility (NBTF) site in Padua
- ☒ MITICA the full size full energy ITER injector prototype being also established at the NBTF

The procurement of the beam source for SPIDER started in October 2012, when a contract was signed between Fusion for Energy and Thales Electron Devices (as group leader of a Consortium created with CECOM Srl, Galvano-T GmbH and Zanon SpA). The contract, still on-going at present stage, has been mostly completed in October 2017 with the delivery of the SPIDER beam source at the NBTF site in Padova Italy.

A review of the fabrication of the main parts and of the aspects of their assembly will be given with a focus on the difficulties encountered and the solutions adopted. The SPIDER beam source is in fact the first ITER full-size source and many of the components had never been manufactured before. Changes in the design induced by the results of the first experiment on the ELISE facility will be also described.

In the assembly phases of the project, some issues hampered the timely completion of the activities calling for delicate evaluations and the need of taking quick decisions. The paper will provide an overview of the risk management performed in support of the decision taken.

Finally, the description of the modifications adopted for the MITICA beam source that were identified during the manufacturing and assembly of the SPIDER beam source will be described in detail.

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