

## **Annex 1: Task description within SP-2. EUROfusion Support to ITER Diagnostics Procured by the EU Focusing on the Development of Synthetic Diagnostics, Analysis Tools, and Calibration Techniques for Activities Not Covered by Other Means**

The EU, through its domestic agency F4E, is involved in the design and procurement of approximately 25% of the ITER diagnostics, such as the Equatorial Visible/Infrared Wide-Angle Viewing System, Radial Neutron Camera-Gamma Spectrometer, Bolometers, Core-Plasma Charge Exchange Recombination Spectrometer, Core-Plasma Collective Thomson Scattering, Magnetics, Plasma Position Reflectometry, and Pressure Gauges. Diagnostics are an essential part of ITER's scientific exploitation and operation, and the range of related activities is wide.

To best prepare for ITER operation and its scientific exploitation, EUROfusion is expanding its existing effort on the development of synthetic diagnostics in support of the EU diagnostic procurements, in liaison with F4E and the ITER Organisation (IO).

Within PrIO SP-2, a task has been defined called “Synthetic Diagnostics in Support of the EU Diagnostic Procurements.” This activity already includes the development of synthetic diagnostics within the Integrated Modelling & Analysis Suite (IMAS) for the ITER Fibre Optics Current Sensor (FOCS), the ITER Fast Ion Loss Diagnostic (FILD), and the ITER Infrared Temperature Diagnostics for offline analysis and real-time application. The objective of the present call is to extend the existing effort to other ITER diagnostics procured by the EU. The proposed development should be fully compatible with the IMAS infrastructure to facilitate integration with data processing tools, control algorithms, and the integrated simulation workflow. In addition, this activity could help to develop advanced analytical tools and calibration techniques to improve prediction and interpretation. The proposed developments could be the subject of testing and validation in experimental facilities. The key deliverable to be reached by 2025 is to provide an open-source ITER synthetic diagnostic that is interfaced with the IMAS framework and/or to provide a calibration technique (e.g., neutron calibration, Infra-Red calibration diagnostics in a metallic walls environment) for a measurement that is directly transferable to ITER applications using the ITER diagnostic specification. Due to limited resources, the selection will be based on the relevance to ITER's first scientific exploitation, the synergy with the existing EUROfusion programme, and compliance with the key deliverable.