

Progress on Diagnostic Integration in DEMO

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Abstract

For the success of fusion as a reliable source of electrical energy, it is required to operate the fusion reactor with a robust plasma scenario supported by accurate predictive machine control in order to respect safety and engineering limits. This can only be accomplished by developing diagnostic systems that probe the plasma with the required measurement capability and are reliable and robust. The harsh environment in a fusion reactor is characterized by high neutron and photon fluxes and fluences that can destroy or hamper the operation of sensors directly or indirectly via radiation-induced effects. This calls for diagnostic systems that can be made radiation hard and also able to be remotely handled. It is a particular challenge to integrate diagnostics in DEMO while accommodating the requirements on plasma measurements accuracy, spatial and time resolutions together with the very limited access for the lines of sight (l.o.s.) and their number, the diameter and length of the l.o.s. openings (#F), interfaces with baseline DEMO system and available space. In this talk we shall go through these challenges with a few examples of diagnostic integration and sensor development.