

Diagnostic Developments for the DIII-D National Fusion Facility

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The DIII-D National Fusion Facility has long been a center of innovation and development of diagnostics for magnetic fusion devices. The DIII-D device, a moderate size tokamak, with a high flexibility shaping coil set, NBI, ECH and ICH heating, supports a very broad research program in fusion science, including critical aspects related to burning plasmas expected to be encountered in ITER. This scientific program is supported by a large set of diagnostics (approximately 50), which is the product of a highly collaborative program between universities, national laboratories and industry. Although many diagnostic systems are now routinely employed to measure the majority of plasma parameters, such as temperature, rotation, density and current profiles, there are many areas that are inherently difficult or prohibitive to diagnose. Such areas include the measurements associated with energetic ion populations or with the characterization of plasma flows in the divertor/edge area. In addition, the study of burning plasmas will require the development of new and updated techniques, which need to be developed and tested in existing devices in relevant plasma conditions. Examples of such development and an overview of outstanding needs will be shown.

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