# Diagnostics for Edge Pedestal Research*

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Edge pedestal research requires measurements which span multiple spatial and temporal scales and include a number of physical processes. H-mode plasmas are characterized by a narrow region of steep gradients in the temperatures and density localized near the plasma boundary. Research seeks to optimize the height of the pedestal for maximum confinement, but avoid large repetitive particle and heat loads in the divertor as a consequence of edge localized modes (ELMs). In this complex region transport physics, stability physics, the physics of the self-driven bootstrap current, and the fueling by neutrals all play key roles. To develop an understanding of the pedestal region, detailed physics measurements of the local gradients, the turbulence spectra, the magnetohydrodynamic (MHD) characteristics, and the neutral fueling are needed with both fine spatial and temporal resolution. MHD stability is determined from measurements of the local current density, pressure gradient, and discharge cross sectional shape. The evolution of the pedestal and the ELMs requires measurements on the 10 s of microsecond time scale. Measurements of density fluctuations, the radial electric field, and rotation of the turbulence provide insight into the turbulence and transport in the edge transport barrier. Two dimensional imaging of neutral line emission provides information on the neutral fueling.

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