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**Frontiers of Beam Diagnostics in Plasma Accelerators: Measuring the Ultra-fast and Ultra-cold**

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Advanced diagnostics are essential tools in the development of plasma-based accelerators. The accurate measurement of the quality of beams at the exit of the plasma channel is crucial to optimize the parameters of the plasma accelerator. 6D electron beam diagnostics will be reviewed with emphasis on emittance measurement, which is particularly complex due to large energy spread and divergence of the emerging beams, and on femtoseconds bunch length measurements.