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## 10.17 The lithium beam as a diagnostic tool for measurement of current density, electron and impurity density, and main ion temperatures in an H-mode pedestal

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The lithium beam is an effective diagnostic tool for investigation of stability and particle transport in the pedestal. It was used successfully to measure edge current density<sup>12</sup> on DIII-D, achieving qualitative agreement with neoclassical models. Electron density profiles were also measured<sup>3</sup>. Proposed upgrades will continue these measurements with higher reliability as well as explore new applications such as measurement of impurity and main ion density and temperature using charge exchange emission, and edge current measurements using high resolution spectroscopy. Beam performance will be optimized using new lithium sources, beam tuning, and monitoring. The optics will be redesigned to optimize throughput and aperture broadening, and to replace the PMTs with APDs. New techniques will be developed for background subtraction, using beam modulation and background monitoring. The new system will yield detailed measurements of the pedestal, complementing existing diagnostics for investigating pedestal stability, ELM cycle, and particle transport through the pedestal. \*Supported by US DOE DE-FG03-96ER54373 and DE-FG02-97ER54415 1D.M. Thomas. AIP Conf. Proc. 926, 56 (2007) 2D.M. Thomas, et al, Phys. Plasmas 12, 056123 (2005) 3H. Stoschus, et. al. Rev. Sci. Instrum. 83, 10D508 (2012)

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