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Development of a Large Diameter Helicon Plasma Source for Development of the Motional Stark Effect with Laser-Induced Fluorescence Diagnostic[1] JOHN DEBARDELEBEN, University of Massachusetts, Amherst, ELIZABETH L. FOLEY, FRED M. LEVINTON, Nova Photonics, Inc. — While the Motional Stark Effect (MSE) diagnostic has been successful in measuring magnetic field pitch angle and radial electric field in tokamaks, there is need to extend its application to measurement of low field (<0.5T) as well as magnetic field magnitude. The use of laser-induced fluorescence on a diagnostic neutral beam is being pursued to this end (MSE-LIF). The test bed for the new diagnostic will be a large diameter helicon plasma source. The design goals are 10^{13} cm^{-3} peak density with >10 cm plasma radius. A neutral beam with low axial energy spread will be injected into the plasma. Hydrogen atoms within the beam will undergo collisions with the plasma, which must be of sufficient density and size for the beam to reach equilibrium excited state populations. A laser tuned to the H-alpha transition will excite electrons from n=2 to n=3. The resulting fluorescence can be analyzed to determine the magnetic field pitch angle and magnitude. This poster will describe the design and construction of the spiral antenna helicon plasma source.

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