Controlled axial density gradient formation for studies of modified, driven electromagnetic fluctuations in ALEXIS

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The Auburn Linear Experiment for Instability Studies (ALEXIS) is a 2m long, 10 cm diameter, inductively coupled, rf, linear plasma device that is designed to support a variety of plasma instabilities and waves. Recent studies in ALEXIS have focused on the production and detection of both electrostatic and electromagnetic waves in the ion cyclotron to low hybrid frequency regimes and then using a biased cylindrical electrode to change local plasma conditions to modify wave propagation. Experiments have been performed in which the cylindrical electrode has been demonstrated to systematically vary the local plasma parameters. It has also been observed that, at certain plasma conditions and electrode bias voltages, light emission from the plasma near the hollow electrode dramatically decreases. Plasma measurements were made in the "dark" regions caused by the electrode biasing. At low RF power input and large negative bias voltages (<-60V) electron density decreased by over an order of magnitude when compared to measurements made with no bias voltage applied to the cylindrical electrode. Spectroscopic measurements were also made in the "dark" regions to fully characterize the decrease in visible light emission. The results of these measurements are presented.