

Abstract Submitted  
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**Imaging polar currents of a dipole-confined plasma using a high-speed, variable gain amplifier system.**<sup>1</sup> S. STATTEL, B.A. GRIERSON, M.W. WORSTELL, M.E. MAUEL — One of the main objectives of the Collisionless Terrella Experiment (CTX) is to measure equilibrium and perturbed plasma structures. For plasmas confined by strong dipole magnets, like planetary magnetospheres, these structures can be diagnosed by imaging the loss current to the magnetic poles. In CTX, the polar current is recorded at high speed (once every  $\mu\text{sec}$ ) with an array of more than 70 gridded particle detectors uniformly distributed in polar longitude and latitude. We have designed, built, and tested a high-frequency, variable-gain transimpedance amplifier that both increases the bandwidth and permits a wider range of plasma loss currents to be observed. The new amplifiers use of a second gain stage and an analog switch that is used to quickly adjust the overall gain of the amplifier array. The new amplifier system will allow the first dynamical measurements of (i) high-density plasma structures and (ii) the full dynamics of the low-to-high density “phase-transitions” that follow programmed gas puffing.

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