

Abstract Submitted  
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**Multiple Current-Free Double Layer Formation in an Expanding Plasma**<sup>1</sup> JERRY CARR JR., MATTHEW GALANTE, DUSTIN MCCARREN, STEPHANIE SEARS, West Virginia University, NJAL GULBRANDSEN, University of Tromsø, ROBERT VANDERVORT, GREGORY LUSK, RICHARD MAGEE, EARL SCIME, West Virginia University — Over the past decade, experimental and theoretical studies have demonstrated the formation of current-free, stable, electrostatic double layers in plasmas with a strong density gradient resulting from a divergent magnetic field. In this work, we present evidence for the formation of multiple double layers within a single divergent magnetic field structure. Downstream of the divergent magnetic field, multiple accelerated ion populations are observed through laser induced fluorescence measurements of the ion velocity distribution function. The formation of the multiple double layer structure is a strong function of the neutral gas pressure in the experiment. The relation of the accelerated ion populations observed in these laboratory experiments to observations in the auroral zone and plasma sheet boundary layer is described.

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