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Characterization of Electrostatic Fluctuations During Electric Double Layer Formation JERRY CARR, West Virginia University, SAIKAT CHAKRABORTY-THAKUR, MATTHEW GALANTE, DUSTIN MCCARREN, STEPHANIE SEARS, RICHARD MAGEE, ERIC REYNOLDS, ROBERT VANDERVORT, GREG LUSK, EARL SCIME, WEST VIRGINIA UNIVERSITY TEAM — Electrostatic probe measurements in pulsed, expanding helicon plasmas indicate the presence of a coherent ∼16 kHz wave when a double layer appears in the expansion region. Time- resolved measurements of the instabilities and the beam component of the ion velocity distribution demonstrate significant correlations throughout the duration of the pulse, approaching unity at times, between the downstream ion beam (the ion beam is a signature of an upstream double layer) and the electrostatic wave amplitudes. The ion velocity distribution is measured with laser induced fluorescence and the waves with a two-tip floating probe. As the helicon source pulse evolves, the double layer appears and then fades away as the amplitude of electrostatic fluctuations increases. The wave measurements yield a parallel wave number of -2.4 cm $^{-1}$ and perpendicular wave number of 1.7 cm $^{-1}$, relative to the background magnetic field. The wave phase speeds are consistent expectations for ion acoustic waves and are observed when the ion beam velocity is approximately twice the ion sound velocity.

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