Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Formation and Consequences of Ion Acoustic Double Layers[1]
ALEXANDER VAZSONYI, Univ of Michigan - Ann Arbor, KENTARO HARA, Stanford University, IAIN BOYD, University of Colorado — Non-monotonic double layers, coherent plasma structures which sustain a potential gradient through an asymmetric potential well (or peak), may develop in a plasma subject to current-carrying instabilities. These structures are known to generate electron phase space holes, signifying a major perturbation to electron transport. In this work, 1D1V Vlasov-Poisson simulations are used to study a plasma subject to the ion acoustic instability. Upon saturation of this instability, a secondary growth of small wavenumber ion acoustic waves occurs which ultimately results in non-monotonic double layer formation. Electron reflection off and acceleration through such a double layer generates a two-stream instability, creating large-amplitude (with respect to the already present ion acoustic waves) plasma waves associated with electron holes. The magnitude of the double layer, found to scale inversely with ion mass, dictates the amount of electron reflection and thus the phase speed of the resulting electron plasma waves.

[1]The first author is supported by the National Defense Science and Engineering Graduate (NDSEG) Fellowship.

Alexander Vazsonyi
Univ of Michigan - Ann Arbor

Date submitted: 25 Jun 2020 Electronic form version 1.4