Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Langmuir Turbulence and Suprathermal Electron Acceleration[1]
PETER YOON[2], University of Maryland, College Park — The suprathermal electron velocity distribution functions (VDFs) with non-Maxwellian tails are commonly detected in the space environment as well as in the laboratory. For instance, since the early days of laboratory beam-plasma experiment, it was known that suprathermal electrons were generated during the experiment. Typical *in situ* spacecraft measurements in the solar wind show that electron (and also ion) VDFs contain quasi power-law velocity tails. These are often empirically modeled by the so-called kappa distribution, but their physical origin is not clearly understood. In this paper a self-consistent theory for the formation of kappa-like distributions is discussed in the context of the electron-Langmuir turbulence interaction process. It is shown that the balance of spontaneous and induced emissions and scattering processes not only lead to the self-consistent determination of asymptotic turbulence spectrum and electron VDF, but also the power-law index associated with the energetic tail is uniquely determined as well. Theoretical predictions of the velocity power-law index is compared against the superhalo electron velocity distribution detected by WIND and STEREO spacecraft. It is shown that the theoretical prediction is in good agreement with the observation.

[1]Research supported by NSF, NASA, and WCU Project
[2][Also at] Kyung Hee University, Korea

Peter Yoon
University of Maryland, College Park

Date submitted: 11 Jul 2012 Electronic form version 1.4