Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Curvature of magnetic field in plasma turbulence YAN YANG, MINPING WAN, Southern University of Science and Technology, RIDDHI BANDYOPADHYAY, WILLIAM MATTHAEUS, University of Delaware, YIPENG SHI, Peking University, TULASI PARASHAR, University of Delaware, QUANMING LU, University of Science and Technology of China, SHIYI CHEN, Southern University of Science and Technology — Magnetic field lines undergo stretch-twist-fold processes in the presence of turbulence. The curvature field, measuring the tangling of the magnetic field lines, is studied in detail here, using both simulations and observations. The probability distribution function (PDF) of the curvature has distinct power-law tails for both high and low limit values. A central finding is that high curvature co-locates with low magnetic field, which gives rise to the power-law tail of PDF at high curvature. The curvature drift term that converts magnetic energy into flow and thermal energy, largely depends on the curvature field behavior, a relationship that helps to explain particle acceleration due to curvature drift. This adds as well to evidence that turbulent effects most likely play an essential role in particle energization since turbulence drives stronger tangled field configurations, and therefore curvature.

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Date submitted: 10 Jul 2019 Electronic form version 1.4