

Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Super GZK” Particles in a Classic Kramers’ Diffusion-over-a-Barrier Model. SAMER ALNUSSIRAT, Louisiana State University, Baton Rouge LA 70803, USA, NASSER BARGHOUTY, NASA HQ, Mail Code 7Z58, Quantum Science Program, HEOMD, Washington DC 20546, USA, GARY WEBB, Center for Space Plasma and Aeronomic Research, The University of Alabama in Huntsville, Huntsville, AL 35805, USA, PETER BIERMANN, MPI for Radioastronomy, Bonn, Germany — We present calculated effects of the dispersion in energy loss in photo-pion reactions on the evolution of ultra-high energy cosmic rays (UHECR) protons’ energy spectrum. Based on a Fokker-Planck transport equation in energy space, whose transport coefficients are calculated using laboratory measurements, and a derived Fokker-Planck potential, our results show that dispersion in energy loss has significant effects in estimating the protons’ horizon distance as well as their energy spectrum. In particular, the Greisen-Zatsepin -Kuzmin horizon in this formalism is estimated to be less than 80 Mpc. In addition, we demonstrate how a Fokker-Planck-potential formalism can distinguish between protons and heavy ions in observed UHECR.

Samer AlNussirat
Louisiana State University, Baton Rouge

Date submitted: 12 Jan 2020

Electronic form version 1.4