Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Effect of Superbanana Diffusion on Fusion Reactivity FRED HINTON, UCSD — The Fokker-Planck equation is solved numerically for the energy distribution of the particles in the tail of the distribution function, assuming a loss rate due to superbanana diffusion. Using a simple random-walk estimate, this loss rate is proportional to a positive power (+7/2) of the particle energy. The rate of repopulation by Coulomb scattering is proportional to a negative power (-3/2) of the particle energy, so the most energetic particles in the tail are most strongly depleted by superbanana diffusion. For ion temperatures relevant for fusion in magnetic confinement devices, it is the tail particles which are most needed for fusion, since the peak of the D-T reaction rate is at roughly 100 kev. The numerically computed energy distribution for the tail particles is used to obtain an integrated fusion reactivity, using a standard fit to the D-T reaction cross section. A plot of reactivity vs loss rate shows that the fusion reactivity is quite sensitive to loss by superbanana diffusion.

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Date submitted: 15 Jul 2010 Electronic form version 1.4