GPPI Homework Set 6

Due on January 13, 2008

Problem 1. Random walk by a drunk

Assume a drunk moving randomly on a street with $\Delta x = 1$ meter every $\Delta t = 1$ second. There is port-o-John at either end of the block (it is New Year's Eve), 20 meter from where he starts. How long does it take for him to diffuse an RMS average distance $\sqrt{\langle x^2 \rangle} = 20$ meters, so that he can statistically reach a bathroom? How much slower is it than if he is not drunk and walk to a bathroom directly?

Problem 2. Cross field transport

Use the random walk model of guiding centers to show that in a magnetized plasma, momentum conserving collisions between particles of the same species do not produce particle transport across magnetic field.