

Physics Undergraduate Seminar

Thursday, February 9th, 09:10. Room P-620

The Study of the Effect of Periodic Boundary Conditions in Computer Simulation of Diffusion and Sub-diffusion of Field Line in 2D+Slab Magnetic Turbulence

by

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Abstract

Magnetic Turbulence is an important phenomenon in plasma physics. This phenomenon occurs when charged particles are moving in a magnetic field under the influence of the Lorentz force with high magnetic Reynolds number. This can induce both particles and magnetic field lines to diffuse randomly. A useful model to describe magnetic turbulence is the two-component model consisting of a slab component, which depends only on the z-coordinate, and two-dimensional (2D) component, depend on both x- and y-coordinates. Both components represent the fluctuations of the magnetic field in the transverse direction. In recent work¹, the computer simulations have shown some results that cannot be clearly described as sub-diffusion. In order to improve the computer simulations, studying the effect of periodic boundary conditions is a thing that should be considered.

Keywords: Magnetic turbulence, 2D+slab, computer simulation. magnetic field

[1] Ghilea, M. C., D. Ruffolo, et al. (2011). "Magnetic Field Line Random Walk for Disturbed Flux Surfaces: Trapping Effects and Multiple Routes to Bohm Diffusion." *The Astrophysical Journal* 741(1).