Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Magnetized Accretion Disk Corona[1] DMITRI UZDENSKY, JEREMY GOODMAN, Princeton University — We present a statistical description of a force-free magnetic field in the corona above a turbulent accretion disk. The field is represented by a statistical ensemble of loops tied to the disk. Each loop evolves under several physical processes: Keplerian shear, turbulent random walk of the disk footpoints, and reconnection with other loops. To build a statistical description, we introduce the distribution function of loops over their sizes and construct a kinetic equation for this function. This Loop Kinetic Equation is similar to Boltzmann's kinetic equation, with reconnection described by a binary collision integral. We solve the equation numerically and obtain a statistical steady state. This allows us to calculate self-consistently the distribution of magnetic pressure with height, the equilibrium shapes of loops of different sizes, and the energy associated with a given loop. We then assess the effectiveness of the coronal magnetic field in transporting angular momentum across the disk and also calculate the energy- and height-distribution of coronal reconnection events.

[1]Work supported by NSF Center for Magnetic Self-Organization

Dmitri Uzdensky
Princeton University

Date submitted: 20 Jul 2007 Electronic form version 1.4