Discrete Time Random Walks and $p$-Adic Brownian Motion.

The fundamental solutions to a large class of pseudo differential equations that generalize the formal analogy of the diffusion equation in the real setting to the $p$-adic setting give rise to $p$-adic Brownian motion. Although the pseudo differential equations appear only formally related to the diffusion equation, there are some striking similarities between real and $p$-adic Brownian motion. We show that a $p$-adic Brownian motion is a limit of a sequence of discrete time random walks on grids in $\mathbb{Q}_p$. These random walks are similar to the random walks that converge to Brownian motion in the real setting. (Received September 22, 2015)