



Algebra and Number Theory Seminar

Title: Finite Fields Meet Markov Chains

Speaker: Persi Diaconis (Stanford)

Date: Thu 1st October 2020 at 2:00PM

Location: Online

Abstract: Let p be a prime. Consider a random walk on $F(p)$ that moves from j to $j^2 + 1$ or $j^2 - 1$ with probability $1/2$ (the square and add Markov chain). It is an open problem to analyze this simple-sounding scheme. We don't even know the support of the stationary distribution. When $p \equiv 3 \pmod{4}$ Jimmy He has determined the stationary distribution but this is open for $p \equiv 1 \pmod{4}$. Squaring is an automorphism for a field of characteristic 2 and, with He and Marty Isaacs we study the 'square and add' chain over $F(2^d)$. For some choice of generators, we can show that $(1/2)d \log d$ steps are necessary and sufficient for mixing BUT the generating set seems to matter and many mysteries remain. This mix of algebra and probability poses simple to state open problems.

<https://ucd-ie.zoom.us/j/95697362979?pwd=U2k2L2VuZ1RVd2NmWldQTEt5VFFLZz09>