

# COMBINATORICS SEMINAR

## Mixing Times for Top to Bottom Shuffles

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Abstract:

A deck of  $n$  cards is shuffled by repeatedly moving the top card to one of the bottom  $k_n$  positions of the deck uniformly at random. How many shuffles does it take to randomize the deck? For  $k_n = n$ , this is the well-studied top to random walk and  $n \log n$  shuffles are required; for  $k_n = 2$ , this is the Rudvalis shuffle and order  $n^3 \log n$  shuffles are needed. I plan to discuss the mixing time for this family of shuffles as  $k_n$  ranges from a constant to  $n$ , showing that for large  $k_n$  the walks behave like the top to random shuffle, while for small  $k_n$  the walks behave like the Rudvalis shuffle. Some of the tools used to analyze these walks include coupling, and comparison techniques for random walks on groups. This talk will be accessible to a broad audience.