

UCCS Department of Mathematics

# Math Colloquium Series

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DATE:

FEBRUARY 16, 2017

TIME:

12:30PM-1:30PM

(REFRESHMENTS AT 12:15PM)

LOCATION:

OSBORNE  
CENTER#A327

## TURNING A COIN INSTEAD OF TOSSING IT

Given a sequence of numbers  $\{p_n\}$  in  $[0,1]$ , consider the following experiment. First, we flip a fair coin and then, at step  $n$ , we turn the coin over to the other side with probability  $p_n$ ,  $n \geq 2$ . What can we say about the distribution of the empirical frequency of heads as  $n \rightarrow \infty$ ?

We show that a number of phase transitions take place as the turning gets slower (i.e.  $p_n$  is getting smaller), leading first to the breakdown of the Central Limit Theorem and then to that of the Law of Large Numbers. It turns out that the critical regime is  $p_n = \text{const}/n$ . Among the scaling limits, we obtain some well known special (Uniform, Gaussian, Semicircle and Arcsine) laws.

The talk is intended to a general audience and no expertise in probability is assumed!

This is joint work with S. Volkov (Lund, Sweden), to appear in JOTP.