UNIVERSITY AT ALBANY
State University of New York

College of Arts and Sciences
Department of Mathematics and Statistics

# Colloquium

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## The Multiplayer Gambler's Ruin Problem

Friday, October 21, 2022
3:00 p.m. in BB-B010
(tea & coffee at 2:45 p.m.)

Abstract. Two players repeatedly play a fair game, exchanging one token after each game while the total number of tokens in play, $N$, is fixed. If player A starts with $x$ tokens, what is the probability that they will end up with all the tokens? This is a basic question for undergraduate probability course and the answer is $x/N$. In this talk, I will discuss the gambler's ruin problem involving three or more players. Suppose three players play as follows: a total of $N$ tokens are in play and $(a, b, c)$ is the initial distribution of tokens between the three players. At each stage, a random pair of the three players plays a fair game and exchange one token. Let $P(N, A, a, b, c)$ be the probability that player A ends up loosing all their tokens first. $P(N, A, N - 2, 1, 1)$ is the probability that the very dominant player A starting with most the tokens ends up loosing first. Can you guess the order of magnitude of $P(N, A, N - 2, 1, 1)$?