

# Algebra/Topology Seminar

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## AVERAGE GENUS AND AVERAGE SIGNATURE OF A 2-BRIDGE KNOT

Thursday, March 7, 2024  
3:00 p.m. in BB-B010

ABSTRACT. Knot theorists have classified small knots via topological, algebraic, and combinatorial invariants: evaluations that do not change even as the 1-dimensional knot is perturbed in 3-dimensional space. We restrict to the infinite class of 2-bridge or rational knots whose simple presentation can be described by a finite sequence of integers and thus by the rational number that is the continued fraction of this sequence.

We consider the genus of the knot, the minimal genus of any orientable surface whose boundary is the knot, and the signature of the knot, the difference between the numbers of positive and negative eigenvalues of a matrix encoding homological information, relying on combinatorial formulas for both.

We compute the average genus and average absolute value of the signature of a 2-bridge knot with crossing number  $c$  as  $c$  approaches infinity. We also prove that the distribution of genera of all 2-bridge knots with a given crossing number approaches a normal distribution.

This is joint work with Adam Lowrance and his undergraduate students Abigail DiNardo, Steven Raanes, Izabella Rivera, Andrew Steindl, and Ella Wanebo.