UNIVERSITY OF TORONTO
FACULTY OF ARTS & SCIENCE | Department of Mathematics

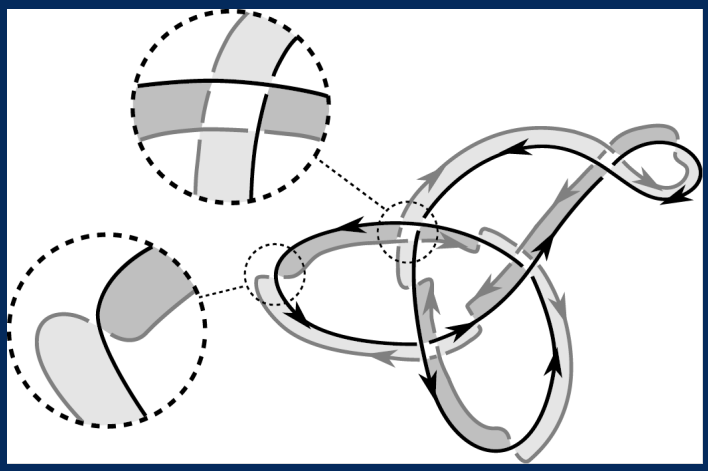
Departmental PhD Thesis Exam

Wednesday, July 9th, 2025 at 2:00 p.m. (sharp)
via Zoom / BA6183

PhD Candidate : Jessica Liu

Supervisor : Dror Bar-Natan

Thesis title : A proof of the Kashaev signature conjecture



Abstract

The Levine-Tristram signature is a well-known invariant of links that is topological in nature – its known definitions rely on manifolds associated with the link and it is related to other topological invariants such as genus, unlinking number, and the Alexander polynomial. In 2018 Kashaev introduced a link invariant defined using a simple algorithm on link diagrams which he conjectured also computes the Levine-Tristram signature. In this thesis we present a method of obtaining Kashaev's invariant using the original Seifert surface definition of the Levine-Tristram signature, making evident the relationship between the two and thereby proving Kashaev's conjecture. We obtain as a corollary another formula for the Alexander polynomial.