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Character Varieties of Knots

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Abstract:
Knot invariants, such as the Jones polynomial and the Reshetikhin-Turaev invariants, are ubiquitous in the study of 3-manifold geometry. Among these invariants, one stands out: the fundamental group of the complement of the knot, also known as the knot group. Particularly interesting is the study of the space of representations of these knot groups, referred to as the character varieties of knots. Even the simplest properties of these character varieties have led to profound results in hyperbolic geometry. However, general methods to uncover the deep geometric features of these spaces are still lacking.

In this talk, we will discuss various aspects of these character varieties from both geometric and algebraic perspectives. Even for character varieties of torus knots, intriguing features emerge that allow us to compare their geometry in both the complex and real cases. Time permitting, we will also explore how Topological Quantum Field Theories can be employed to provide unexpected generalized skein relations for the arithmetic of character varieties of knots over finite groups.

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