Utah State University

Pure Mathematics Seminar
October 13, 2022
3:30pm-5:00pm in ANSC 314

Speaker #1: Adam Robertson (Utah State University)
Title: Reshetikhin-Turaev invariant constructed using the ribbon category of representations of U^H_q(sl2(C))
Abstract: This is the first half of a joint talk whose goal is to give an exposition of the theory of renormalized quantum link invariants due to Costantino, Geer, Patureau-Mirand, Turaev and others. The second half will be given by Jan-Luca Spellman. I define the unrolled quantum group U^H_q(sl2(C)) and identify a particular subcategory of the category of U^H_q(sl2(C))-representations. I explain why this subcategory is a non-semisimple ribbon category. Such a category is a suitable candidate for constructing a quantum link invariant using the Reshetikhin-Turaev approach. I show that, unfortunately, because the ribbon category is non-semisimple, the link invariant constructed is trivial. Based on a collaboration with Nathan Geer, Jan-Luca Spellman, and Matt Young.

Speaker #2: Jan-Luca Spellmann (Utah State University)
Title: Renormalized Reshetikhin-Turaev quantum invariants for U^H_q(sl2(C))
Abstract: This is the second half of a joint talk with Adam Robertson. The goal of the talk is to give an exposition of the theory of renormalized quantum link invariants due to Costantino, Geer, Patureau-Mirand, Turaev et al. I will explain how to modify the usual Reshetikhin-Turaev invariants associated to a subcategory of representations of the restricted unrolled quantum group U^H_q(sl2(C)) to give new non-trivial link invariants. Their characteristics will be exhibited with the help of several examples.

Speaker #3: Matthew Burnham (Utah State University)
Title: Structure of singular and nonsingular tournament matrices
Abstract: A tournament is a directed graph resulting from an orientation of the complete graph; so, if M is a tournament's adjacency matrix, then M + M^T is a matrix with 0's on its diagonal and all other entries equal to 1. An outstanding question in tournament theory asks to classify the adjacency matrices of tournaments which are singular (or nonsingular). We study this question using the structure of tournaments as graphs, in particular their cycle structure. More specifically, we find, as precisely as possible, the number of cycles of length three that dictates whether the corresponding tournament matrix is singular or nonsingular. We also give structural classifications of the tournaments that have the specified numbers of cycles of length three.