THE UNIVERSITY  OF HONG KONG

Institute of Mathematical Research
Department of Mathematics
New Cornerstone Science Laboratory

Representation Theory and Number Theory (RANT) Postdoc Workshop

2pm-2:20pm Ruben La (HKU)

Title: Algorithm for Iwahori-Matsumoto duality for tempered representations of affine Hecke algebras

Abstract: The Iwahori-Matsumoto involution is an algebra involution on (graded) affine Hecke algebras that can be defined in terms of its Bernstein generators. This involution induces an involution on the Grothendieck group of finite-dimensional representations of the (graded) affine Hecke algebra. Due to Lusztig's work, the unipotent representations of p-adic groups can be studied by studying the representations of certain associated (graded) Hecke algebras. The goal of my project is to determine an explicit algorithm for the Iwahori-Matsumoto involution of irreducible tempered representations with real infinitesimal character of graded Hecke algebras associated to the simple p-adic groups of type B and C (of any isogeny type) and of the even special orthogonal group.

2:20pm-2:40pm Wonwoong Lee (HKU)

Title: Algebraic independence of the Eisenstein series

Abstract: In this talk, I will present the result about the algebraic independence of the values of the exponential function and the Eisenstein series. As an application, I will discuss the simplicity of zeros of Eisenstein series and, more generally, the common zeros of quasimodular forms.

2:40pm-3pm Felix Schremmer (HKU)

Title: Affine Deligne-Lusztig varieties via the quantum Bruhat graph

Abstract: We introduce affine Deligne-Lusztig varieties as geometric objects related to two natural decompositions of a certain p-adic Lie group. The geometric properties of these varieties are of key interest for a number of mathematical subjects, most famously the reduction of Shimura varieties, i.e. ultimately the Langlands program. Following my PhD thesis, I explain how to describe the generic Newton strata by using the quantum Bruhat graph.

3pm-3:20pm Qian Tang (HKU)

Title: Riemann-Hilbert problem for confluent hypergeometric systems

Abstract: My main work during my PhD was to study the Riemann-Hilbert problem for confluent hypergeometric systems. Starting from this linear ODE, we gave a relatively effective algorithm to compute its Stokes matrix and monodromy matrix, which also established the connection between the Stokes matrix and continued fractions. On the other hand, if the monodromy matrix is given, we can also construct the corresponding confluent hypergeometric system effectively, which also gives the asymptotic behavior of the solution of the corresponding isomonodromy equation. The author is also working on the corresponding WKB problem, in the 2nd order case, people have established the connection with Cluster algebra.

3:20pm-3:40pm Break

3:40pm-4pm Qingchao Yu (HKU)

Title: The essential gaps between Newton polygons

Abstract: Newton polygon arises naturally in arithmetic geometry and plays an important role. In this 15 minutes talk, I will give a very brief introduction to Newton polygon. In my recent joint work with Xuhua He and Sian Nie, we introduce the notion of essential gap between Newton polygons and use it to classify dimension zero Affine Deligne-Lusztig variety, solving a conjecture of M. Rappoport.

4pm-4:20pm Weinan Zhang (HKU)

Title: Quantum symmetric pairs and i-quantum groups

Abstract: Introduced by Drinfeld and Jimbo in the 1980s, quantum groups have played a crucial role in modern representation theory and have applications in mathematical physics, combinatorics, and geometry. The classical theory of symmetric pairs concerns Lie algebras with involutions. The theory of quantum symmetric pairs, systematically developed by Letzter around 2000, is a quantization of classical symmetric pairs. The i-quantum groups, arising from quantum symmetric pairs, are certain coideal subalgebra of quantum groups. The i-quantum groups can be viewed as a natural generalization of quantum groups, and many results for quantum groups have been generalized to i-quantum groups.

In this talk, we will give a brief introduction to the theory of quantum symmetric pairs and survey our recent construction of (relative) braid group symmetries on i-quantum groups. These symmetries generalize Lusztig's braid group symmetries on quantum groups.

4:20pm-4:40pm Aron Heleodoro (HKU)

Title: Homotopical methods in geometric representation theory

Abstract: Many interesting results in geometric representation theory use a considerable amount of theory from algebraic geometry and sheaf/category theory to be precisely enunciated and proved. In this talk, I will recall two examples of these results (the geometric Satake and the computation of the center of a finte Hecke category) and explain how ∞-categorical methods and derived algebraic geometry are needed to generalize these results.

4:40pm-5pm Bin Wang (CUHK)

Title: Picard groups of spectral varieties and application to Higgs pairs

Abstract: In this talk, we show how to identify Picard groups of certain spectral varieties with that of the base variety. This is a Noether-Lefschetz type theorem. We then apply it to moduli of Higgs pairs. This is a joint work with Xiaoyu Su.

Date:	September 21, 2023 (Thursday)
Time:	2:00 – 5:00pm
Venue:	Room 210, Run Run Shaw Bldg., HKU

All are welcome