

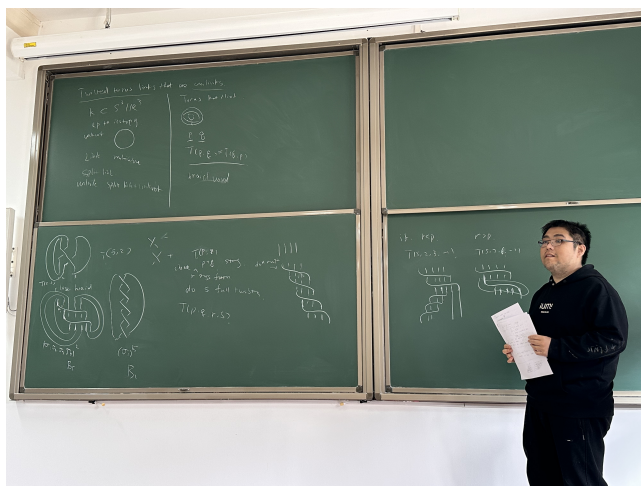
BICMR POSTDOC SEMINAR SCHEDULE
SPRING 2026
LOCATION: ROOM 77201, JINGCHUNYUAN 78, BICMR
EVERY FRIDAY 15:00

Twisted Torus Links That Are Unlinks.

Speaker: Hong Chang (常洪)

Date: March 25

Abstract. A twisted torus link $T(p, q, r, s)$ is obtained by performing s full twists on r adjacent strands of the (p, q) -torus link. In this talk, we classify twisted torus links that are unlinks. We give a complete characterization of all parameter families (p, q, r, s) for which the associated twisted torus link is an unlink. This is a joint work with Thiago de Paiva and Qing Lan.



Sampling Gibbs Distribution for Ising Model using Machine Learning

Speaker: William Vickery

Date: April 3

Abstract. AI for Science and AI for mathematics are now major international research projects. One aspect of AI for science is modelling systems using machine learning which in the past were modelled using classical tools like ODE or PDE. Classical experimental science typically incorporates both an explanatory model and a probabilistic/statistical model for estimating model parameters with experiments. We make a foray into the latter problem by developing a machine learning system in pytorch for sampling the Gibbs distribution of the Ising model. We use the classical metropolis algorithm to generate approximate samples for the Ising model on a 10,000x10,000 grid. Then we train a neural network to estimate the function that maps a configuration of the grid to the results of applying the metropolis algorithm for 1000 steps. The result is a pseudorandom sampler, analogous to the Mersenne Twister. Most pseudorandom samplers approximate the uniform probability distribution. However we are approximating a non-uniform probability distribution. Like a uniform pseudorandom sampler, our neural network produces a cyclical deterministic sequence of elements with a long cycle length. However the frequency distribution for configurations of a cycle will approximate the Gibbs distribution for the Ising model Hamiltonian.



Lehmer codes and Poincaré polynomials of Schubert varieties in types A and B

Speaker: Gaston Burrull

Date: April 10

Abstract. I will begin with an introduction to the combinatorics of Bruhat orders in types A and B, including the role of Lehmer codes. I will then give an overview of Bolognini–Sentinelli’s work characterizing the Poincaré polynomials of smooth Schubert varieties in type A. Finally, I will show how to extend this characterization to type B via the combinatorics of reflected bounded growth sequences.

Categorification of canonical basis and PBW basis

Speaker: Yumeng Wu (吴雨檬)

Date: April 17

Abstract. This talk discusses a geometric and categorical approach to canonical bases and PBW bases arising from Hall algebras of quivers with admissible automorphisms. We begin with the Hall algebra via function of finite-dimensional basic hereditary algebra over a finite field, and recall how the composition subalgebra of it recovers the negative part of the quantum group attached to a symmetrizable Cartan matrix. We then review Lusztig’s sheaf-theoretic construction of \mathbb{U}^- via flag varieties, induction and restriction functors, and simple perverse sheaves, together with its extension to the symmetrizable setting through periodic functors induced by quiver automorphisms. The main part of the talk is devoted to recent joint work with Yixin Lan and Jie Xiao, where we study the categorification of canonical and PBW bases of symmetrizable cases in derived categories of equivariant sheaf complexes. In particular, we explain how canonical basis elements, represented by intersection cohomology complexes, can be expanded in terms of standard sheaf complexes in a modified Grothendieck group, and how the coefficients are described by explicit polynomials encoding eigenvalue data of the automorphism action on stalk cohomology. We also discuss the resulting triangularity, integrality, and polynomiality properties, which provide a sheaf-theoretic interpretation of the transition between canonical bases and PBW-type bases in the symmetrizable case.

A skew Murnaghan–Nakayama rule for Hopf dual pairs

Speaker: Ning Liu 刘宁

Date: April 24

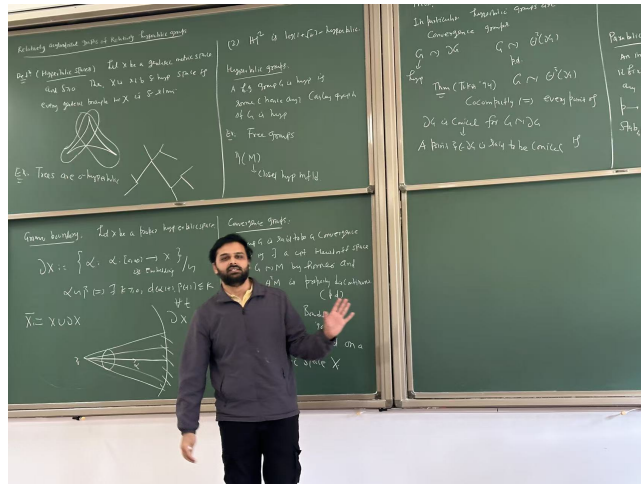
Abstract. The Murnaghan–Nakayama rule is an iterative formula for computing the irreducible characters of symmetric groups, introduced in the 1930s. Since then, a long series of generalizations and variants of this formula has been developed. In this talk, I will present a uniform skew Murnaghan–Nakayama rule for graded Hopf dual pairs equipped with a nondegenerate Hopf pairing. I will explain how this framework recovers and extends the classical skew Murnaghan–Nakayama rule in symmetric function theory. If time permits, I will also sketch the main ideas of the proof.

Relatively acylindrical graphs of relatively hyperbolic groups

Speaker: Ravi Tomar

Date: May 8

Abstract. In his seminal essay, Gromov revolutionized the theory of infinite groups by treating them as geometric objects. In the same essay, he introduced the notions of hyperbolic and relatively hyperbolic groups. In this talk, I will first discuss relatively hyperbolic groups and introduce the notion of relatively acylindrical graphs of relatively hyperbolic groups. I will then present a combination theorem for such graphs for groups.

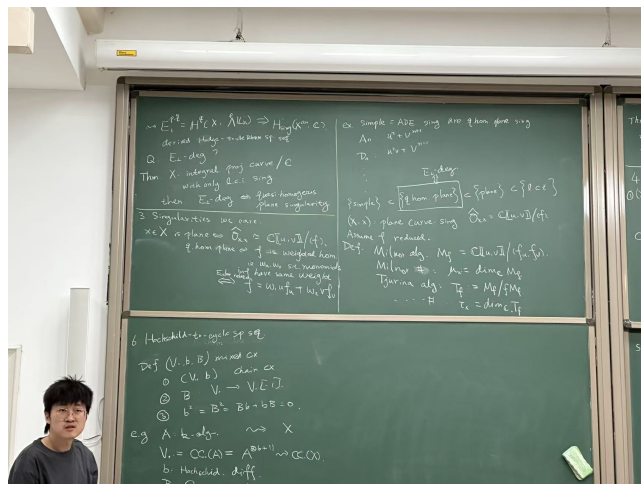


Hodge-to-de Rham degeneration for singular curves

Speaker: Yunfan He (何云帆)

Date: May 15

Abstract. For a smooth projective variety, Deligne and Illusie proved that the Hodge-to-de Rham spectral sequence degenerates at the first page. For singular varieties, this classical picture no longer holds. In this talk, I will discuss what happens for integral projective curves with local complete intersection singularities. I will explain that the derived Hodge-to-de Rham spectral sequence degenerates at the second page exactly when all singularities are quasihomogeneous plane curve singularities.

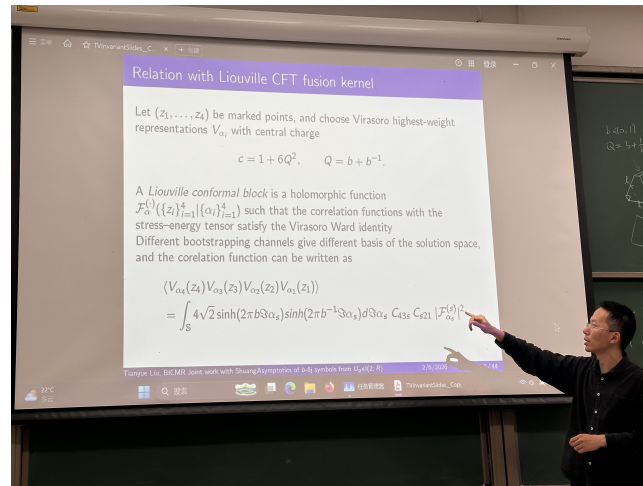


Asymptotics of b -6j symbols from $U_q(\mathfrak{sl}(2; R))$

Speaker: Tianyue Liu (刘天约)

Date: May 22

Abstract. In this talk I will present recent results on various classical limits of the b -6j symbol and relate them to the geometry of hyperideal tetrahedrons. We will discuss two regimes: In the first we obtain the volume of hyperbolic tetrahedrons, which has been used to show that a Turaev-Viro type invariant recovers the hyperbolic volumes for certain three manifolds. In the second we obtain the volume of AdS tetrahedrons, which are related to the generating function between Fenchel-Nielsen coordinates on a four-hole sphere. This talk is based on joint work with Shuang Ming, Xin Sun, Baojun Wu and Tian Yang.

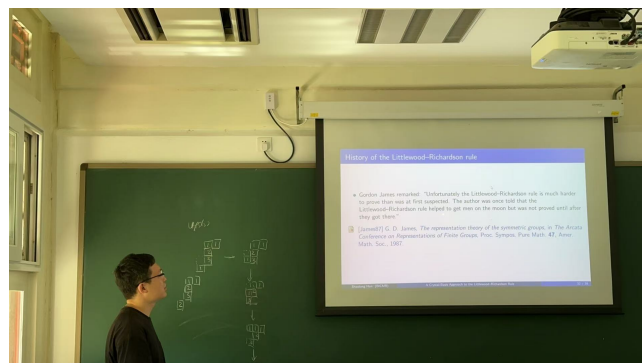


A Crystal-Basis Approach to the Littlewood-Richardson Rule

Speaker: Shaolong Han (韩绍龙)

Date: May 29

Abstract. The Littlewood-Richardson rule is a central result in representation theory and algebraic combinatorics, describing tensor product decompositions and products of Schur polynomials. This talk presents the rule from the viewpoint of crystal bases. Beginning with $U_q(\mathfrak{sl}_2)$, I will explain how crystal graphs encode the combinatorial structure of representations in the limit $q \rightarrow 0$. I will then discuss crystal bases for $U_q(\mathfrak{sl}_n)$, their realization by semistandard Young tableaux, and the interpretation of Littlewood-Richardson coefficients as counting highest weight elements in tensor products of crystals.

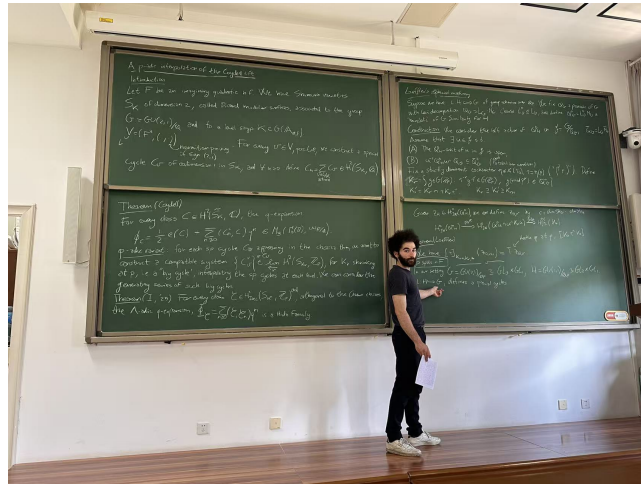


A p-adic Interpolation of the Cogdell Lift

Speaker: Francesco Iudica

Date: June 03

Abstract. The Cogdell lift is the analogue for Picard modular surfaces of the celebrated Hirzebruch-Zagier theorem. Roughly speaking, the lift takes a class in middle cohomology of a fixed modular surface, and lifts it to a Fourier series whose coefficients are intersection multiplicities of special cycles. Cogdell's result states that the Fourier expansion is in fact an elliptic modular form. In this talk, we apply Loeffler's formalism of spherical varieties to obtain a p-adic analytic version of Cogdell's theorem.



Some results on small arboreal Galois representation

Speaker: Zhixun Liang (梁志勋)

Date: June 10

Abstract. This presentation is about classifying arboreal Galois groups with either abelian or small image, and we show some partial results in each case. In particular we are able to give some results toward a conjecture of Andrews-Petsche using theory of equi-distribution and Minkowski dimension. It is a joint work with Clayton Petsche.