TITLES AND ABSTRACTS

The center of affine vertex superalgebras at the critical level via W-algebras

Drazen Adamovic, University of Zagreb

The basic problem for vertex algebras at the critical level is to describe their centers. In the Lie algebra case, the center was described by B. Feigin and E. Frenkel and it is isomorphic to principal affine W-algebras at the critical level. In the Lie superalgebra case, the structure of the center at the critical level is much more complicated since the center need not be finitely generated and the principal affine W-algebras are not commutative. In this talk we describe recent progress in describing the center for affine vertex superalgebras associated to $sl(m|n)$. We discuss a general conjecture about the structure of the center and prove it in a number of cases by identifying the associated affine W-algebras. We present details in the case of the Lie superalgebra $sl(n|1)$. We also show how the inverse quantum hamiltonian reduction can be applied on vertex algebras at the critical level. This talk is based on joint work with B. Feigin and S. Nakatsuka.

Generalized Symmetries From Fusion Actions

Chongying Dong, UCSC

Finite automorphism groups of nice vertex operator algebras (VOAs) have been well-studied in orbifold theory. Galois correspondence and Schur-Weyl duality were established for these finite group actions on VOAs. In this talk, we introduce an action of fusion categories on a condensable algebra in a modular fusion category via the generalized Frobenius-Schur indicators. In this context, we have established the Galois correspondence and Schur-Weyl duality, which are generalizations of the corresponding results in orbifold theory of VOAs. As an application, we determine the automorphism group of any condensable algebra explicitly. This talk is based on a joint work with Siu-Hung Ng, Li Ren and Feng Xu.

A chromatic decomposition of Nakajima varieties

Peter Fiebig, FAU Erlangen-Nürnberg

We describe a p-adic chromatic decomposition of the (generalised) cohomology Nakajima's quiver varieties and outline possible applications towards

modular and quantum representation theories. This is joint work with Yaping Yang and Gufang Zhao.

Smooth representations of Affine Lie algebras

Vyacheslav Futorny, SUSTech

We will discuss the current state of the problem of classifying irreducible smooth representations of Affine Kac-Moody algebras.

BRST cohomology and associated variety

Naoki Genra, University of Toyama

BRST cohomology is an analogous method with Hamiltonian reductions to obtain new vertex algebras from given ones. Using ideas of Arakawa-Moreau, we can compute the associated graded PVA of the BRST cohomology VA, and thus the associated variety. We explain these ideas in case of (non h-adic) boundary VOAs from 3d N=4 quiver gauge theory, following the definitions by Coman-Shim-Yamazaki-Zhou.

Current algebras and Poisson vertex algebras from dg manifolds

Noriaki Ikeda, Ritsumeikan University

Current algebras are classical counterparts of vertex algebras. Current algebras have been analyzed from the aspect of Poisson geometry. We obtain a systematic formulas to construct general current algebras from differential graded (dg) symplectic manifolds, which include known current algebras. New current algebras have been discovered using this formula. If we have time, dg manifold formulations of the Poisson vertex algebras and the classical r-matrices connected to current algebras are presented. This work is based on a collaboration with Xiaomeng Xu and partially with Wenda Fang.

Maximal ideals of $V^k(\mathfrak{g})$ and associated varieties of $L_k(\mathfrak{g})$ of type G_2 for $k = -4 + \frac{2}{3(2m+1)}$

Cuipo Jiang, Shanghai Jiao Tong University

We will talk about some recent results on determining maximal ideals of $V^k(\mathfrak{g})$ and associated varieties of $L_k(\mathfrak{g})$ for $\mathfrak{g}$ being of type G_2. We give the weights of singular vectors of $V^k(\mathfrak{g})$ with minimal conformal weights when $V^k(\mathfrak{g})$ are not simple. For the cases that $k = -4 + \frac{2}{3(2m+1)}$, $m \geq 0$, we further prove that the maximal ideal of $V^k(\mathfrak{g})$ is generated by one singular vector.

The associated varieties of $L_k(\mathfrak{g})$ are also determined for $k = -4 + \frac{2}{3(2m+1)}$, $m \geq 0$. This talk is based on joint work with Yubing Zhang.

Quantum Littlewood correspondences

Naihuan Jing, North Carolina State University

In the 1940s Littlewood formulated three fundamental correspondences parallel to the Schur-Weyl duality. I will talk about how to introduce the quantum version of quantum immanants and the quantum Littlewood correspondences between quantum immanants and Schur functions for the quantum general linear group and the Heck algebra. Via the correspondences, we have found an exact relationship between the Gelfand-Tsetlin bases of $U_q(gl(n))$ and Young's orthonormal bases for the Hecke algebra. This leads to a trace formula for the quantum immanants that has settled the generalization problem of q-analog of Kostant's formular for λ-immanants. As applications, we also derive general q-Littlewood-Merris-Watkins identities and q-Goulden-Jackson identities as special cases of the quantum Littlewood correspondence III. This is joint work with Jian Zhang.

Coloured invariants of torus links and characters of W-algebras

Shashank Kanade, University of Denver

I'll explain some of my results on the relationship between large colour limits of Jones invariants of torus links coloured with irreducible representations of a simply laced Lie algebra on the one hand and characters of the corresponding principal W-algebra VOAs on the other. This leads to a number of speculations and conjectures regarding: (a) similar limits for other knots, (b) asymptotic weight and tensor product multiplicities for Lie algebras, and finally, (c) a curious rank-recursion on characters of principal W-algebras of type A.

Universal Capelli identities and quantum immanants for q_N

Iryna Kashuba, SUSTech

We apply the recently introduced idempotents for the Sergeev superalgebra to construct quantum immanants for the queer Lie superalgebra q_N as central elements of its universal enveloping algebra. We prove a universal Capelli identity for q_N and use it to calculate the images of the quantum immanants under the action of q_N in differential operators. We show that the Harish-Chandra images of the quantum immanants coincide with the factorial Schur Q-polynomials. This is joint work with Alexander Molev.

TBA

Libor Křižka, Charles University

Sheaves of h-adic vertex algebras on Nakajima quiver varieties and their global sections

Toshiro Kuwabara, University of Tsukuba

Motivated by recent developments in theoretical physics on $3d$ and $4d$ superconformal field theories, the study of sheaves of h-adic vertex algebras on toric hyperkähler manifolds and Nakajima quiver varieties has become increasingly important in recent years. In the context of representation theory, such vertex algebras can be regarded as vertex-algebra analogues of rational Cherednik algebras and quantizations of conical symplectic singularities. In this talk, I will give a review of the construction of such sheaves of vertex algebras and explain ongoing work on the problem of determining their global sections.

Universal objects for W-algebras of classical types

Andrew Linshaw, University of Denver

I will discuss a conjectural picture that organizes all W-algebras of classical Lie types into families that are governed by universal 2-parameter vertex algebras. These are natural generalizations of the 2-parameter $W_{1+\infty}$-algebra whose 1-parameter quotients are the Y-algebras of Gaiotto and Rapcak. This is based on joint work with Thomas Creutzig and Vladimir Kovalchuk

Equivariant multiplicative vertex algebras and their role in wall-crossing

Henry Liu, Kavli IPMU

A vertex algebra structure on the homology of certain moduli stacks naturally arose in Joyce's recent work on wall-crossing formulas. It is essentially an instance of Borcherds' bicharacter construction. By refining homology to K-homology (resp. cohomology to K-theory), and by working equivariantly with respect to torus actions, this vertex algebra construction is refined and deformed into an "equivariant multiplicative vertex algebra", with some new features not seen by ordinary vertex algebras. I will briefly explain how such multiplicative vertex algebras are used in K-theoretic wall-crossing,

and pose some (hopefully) interesting questions about their algebraic and representation-theoretic nature.

Crossed Extensions of Pointed Braided Tensor Categories of Tambara-Yamagami Type

Sven Möller, Maynooth University

Representation theories of (sufficiently nice) vertex algebras are braided tensor categories. One of the central problems is the orbifold problem. Given a faithful action of some group G on a vertex algebra V, one wants to understand the representation category of the fixed-point subalgebra V^G or, equivalently, the category of G-twisted V-modules, which is not braided, but G-crossed braided. Explicit descriptions (beyond just stating the fusion ring) of such braided G-crossed tensor categories are typically difficult to obtain. Recently, some progress was made in the situation when the representation category of the original vertex algebra is pointed, i.e. characterised by a quadratic form. In this talk, I will present results that generalise the well-known Tambara-Yamagami categories to arbitrary cyclic groups G. This corresponds to orbifolds of lattice vertex algebras under fixed-point free automorphisms. This is based on joint work with Hannes Knötzele.

Modularity of weight categories over admissible-level affine VOAs

David Ridout, University of Melbourne

This is an overview talk covering various aspects of the representation theory of admissible-level affine VOAs, focusing on the examples corresponding to sl_2 and sl_3.

Vertex operator algebras and automorphic forms

Nils Scheithauer, TU Darmstadt

We review the role of Jacobi forms and orthogonal modular forms in the classification of holomorphic vertex operator algebras of central charge 24. We then discuss possible connections between certain Eisenstein series and these vertex operator algebras. This is joint work with M. Müller.

Vertex algebras and quantum Hamiltonian integrable system

Zhe Wang, RIKEN

The deep relationships between vertex algebras and integrable systems have been long studied. In this talk, I will propose a possible framework towards studying quantum integrable systems via vertex algebras and try to relate them to enumerative geometry. In particular, I will give a detailed construction of quantum dispersionless KdV hierarchy as an example.

Virasoro and super Virasoro tensor categories

Jinwei Yang, Shanghai Jiao Tong University

Virasoro and super Virasoro algebra play fundamental roles in the study of infinite dimensional Lie (super)algebras and (super) conformal field theories. We first construct braided tensor categories on the category of finite length modules for the (super) Virasoro algebra at an arbitrary central charge, and then prove their rigidity. Using the rigid braided tensor category structure, we construct the projective covers of simple objects and determine fusion product decompositions in these categories. If time permits, we also discuss the correspondence between representation categories of (super) Virasoro algebra and those of affine Lie algebras and quantum groups.