# Invited Talks

**MICHAEL EHRIG**
**Mathematical Institue, University of Bonn, Germany**

*MV-polytopes/cycles and affine buildings*

We give a construction of MV-polytopes of a complex semisimple algebraic group G in terms of the geometry of the Bott-Samelson variety and the affine building. This is done by using the construction of dense subsets of MV-cycles by Gaussent and Littelmann. They used LS-gallery to define subsets in the Bott-Samelson variety that map to subsets of the affine Grassmannian, whose closure are MV-cycles. Since points in the Bott-Samelson variety correspond to galleries in the affine building one can look at the image of a point in such a special subset under all retractions at infinity. We prove that these images can be used to construct the corresponding MV-polytope in an explicit way, by using the GGMS strata. Furthermore we give a combinatorial construction for these images by using the crystal structure of LS-galleries and the action of the ordinary Weyl group on the coweight lattice.

**FARKHOD ESHMATOV**
**University of Michigan**

*Automorphism groups of rings of differential operators and the Calogero-Moser correspondence*

Coauthors: Y. Berest and A. Eshmatov

Let $D$ be an associative $\mathbb{C}$-algebra Morita equivalent to the first Weyl algebra $A_1 := \mathbb{C} < x,\, y > /(xy-yx-1)$. It is well known that if $D$ has zero divisors, then it is isomorphic to the ring $\mathbb{M}_{r\times r}(A_1)$ of matrices over $A_1$ of some dimension $r > 1$ (and, of course, two such matrix rings are isomorphic if and only if they have the same $r$). On the other hand, if $D$ is a domain, then it cannot be isomorphic to $\mathbb{M}_{r\times r}(A_1)$ for $r > 1$. It is a remarkable fact that non-isomorphic domains in the Morita class of $A_1$ can still be classified by a single non-negative integer $n$, with $n = 0$ corresponding to $A_1$. Like the Weyl algebra itself, these domains can be realized as rings $D_n := \mathbb{D}(X_n)$ of global differential operators on some rational algebraic curves $X_n$, and the natural invariants, which distinguish non-isomorphic members in the family $\{D_n\}$, are the automorphism groups $G_n := \mathrm{Aut}_{\mathbb{C}}(D_n)$. The group $G_0 = \mathrm{Aut}_{\mathbb{C}}(A_1)$ was explicitly described by J. Dixmier in 1968. In this talk, we will explain how Dixmier's results generalize for an arbitrary $G_n$. Our description of these groups is based on a geometric classification of ideals of $A_1$ in terms of Calogero-Moser spaces (due to Berest and Wilson). We will also explain how $G_n$ can be viewed as infinite-dimensional algebraic groups in the sense of Shafarevich. [This is joint work (in progress) with Yu. Berest and A. Eshmatov.]

**GHISLAIN FOURIER**
**University of Cologne**

*A categorical approach to Weyl modules*

Coauthors: Vyjayanthi Chari, Tanusree Pal

Global and local Weyl Modules were introduced via generators and relations in the context of affine Lie algebras in a work by Chari and Pressley and were motivated by representations of quantum affine algebras. The more general case these modules associated to the coordinate ring of an affine variety was considered by Feigin and Loktev. We show that there is a natural definition of the local and global modules via homological properties. This characterization allows us to define the Weyl functor from the category of left modules of a commutative algebra to the category of modules for a simple Lie algebra. As an application we are able to understand the relationships of these functors to tensor products, generalizing previous results. Finally an analysis of the fundamental Weyl modules proves that the functors are not left exact in general, even for coordinate rings of affine varieties.

**VICTOR GINZBURG**
**University of Chicago**

*Quantization of Bezrukavnikov's equivalence*

We construct an equivalence between an equivariant derived category of Iwahori-constructible sheaves on the affine flag variety and a certain derived category of 'asymptotic' Harish-Chandra D-modules on the square of the flag variety for the Langlands dual group. Our equivalence may be seen as a 'quantum/equivariant' deformation of the equivalence established by R. Bezrukavnikov some time ago. At the same time, our equivalence is an extension of the equivalence between an equivariant derived Satake category and a derived category of asymptotic Harish-Chandra bimidules constructed more recently by Bezrukavnikov and Finkelberg.

**JACOB GREENSTEIN**
**University of California Riverside**

*Quivers with relations and representations of graded current algebras*

Let $\mathfrak{g}$ be a finite dimensional simple Lie algebra. One can prove that classical limits of Kirillov-Reshetikhin modules can be regarded as indecomposable graded representations of truncated current algebra of $\mathfrak{g}$. This observation motivated the study of the category of such representations by V. Chari and myself. In particular, we constructed an infinite family of non-commutative Koszul algebras of finite global dimension corresponding to "extremal" sets of positive roots of $\mathfrak{g}$. A remarkable property of these algebras is that relations in them can be computed explicitly. In this talk we provide a combinatorial description of families of quivers corresponding to these algebras and discuss the computation of relations.

**NAIHUAN JING**
**North Carolina State University**

*Realizations of classical toroidal Lie algebras*

Classical affine algebras are constructed mainly by vertex operators in either bosonic or fermionic fields. In mid 80's Feingold and Frenkel systematically realized classical affine algebras by infinite dimensional Clifford (fermion) or Weyl (boson) algebras for most types. In this talk we will generalize and expand this construction to toroidal cases. In particular our construction also provides fermionic (resp. bosonic) construction for symplectic (resp. orthogonal) toroidal Lie algebras, which were not available even in affine cases. The talk consists of joint work with K. Misra and C. Xu.

**BRANT JONES**
**University of California, Davis**

*Affine structures for certain $E_6$ crystals*

Coauthors: Anne Schilling

Let $\mathfrak{g}$ be an affine Kac–Moody algebra and $U_q'(\mathfrak{g})$ be the associated quantized affine algebra. Kirillov–Reshetikhin modules are finite dimensional $U_q'(\mathfrak{g})$-modules labeled by a node $r$ of the Dynkin diagram together with a nonnegative integer $s$. It is expected that each Kirillov–Reshetikhin module has a crystal basis. In this talk, we focus on type $E_6^{(1)}$ for which Chari has given the decomposition of Kirillov–Reshetikhin modules into classical highest-weight modules. We extend the classical crystals for these modules to give an explicit combinatorial realization of the Kirillov–Reshetikhin crystals when $r$ is 1, 6 or 2 in the Bourbaki labeling and $s$ is arbitrary. This realization is based on the technique of promotion that has been used for other types by Shimozono and Fourier, Okado, Schilling.

This is joint work with Anne Schilling.

**JOEL KAMNITZER**
**University of Toronto**

*Categorified geometric skew Howe duality*

Coauthors: Sabin Cautis, Anthony Licata

I will explain how to categorify the braiding between fundamental representations of quantum sl(m), in terms of coherent sheaves on convolution varieties of the affine Grassmannian. Our construction uses Mirkovic-Vybornov's geometric skew duality as well as Chuang-Rouquier's theory of categorical sl(2) actions.

**AARON LAUDA**
**Columbia University**

*Categorifying quantum groups*

Coauthors: Mikhail Khovanov

I'll explain joint work with Mikhail Khovanov on a categorification of one-half of the quantum universal enveloping algebra associated to a simply-laced Dynkin diagram. This categorification is obtained from the graded representation category of certain graded algebra that can be defined using a graphical calculus.

**TONY LICATA**
**Stanford University**

*Goresky-Macpherson duality and deformations of Koszul algebras.*

Coauthors: Tom Braden, Chris Phan, Nick Proudfoot, and Ben Webster

A standard Koszul algebra has a canonical deformation which is analogous in many respects to the torus-equivariant cohomology ring of a variety with a finite torus fixed-point set. The centers of Koszul dual deformations satisfy a duality of commutative algebras first observed by Goresky and Macpherson in the context of equivariant cohomology rings of flag varieties and Springer fibers.

**ANTON MALKIN**
**University of Illinois**

*Stacky geometric quantization*

Coauthors: Eugene Lerman

I'll describe geometric (pre)quantization on/via stacks as a functor from geometric data (symplectic form + holonomy) to linear data (Hermitian line bundle with connection). This construction interpolates between characters of groups and line bundles on manifolds. It is also local unlike the usual geometric quantization, and it can be generalized to higher degrees (e.g. circle gerbes).

**IVAN MIRKOVIC**
**U. of Massachusetts, Amherst**

*Modular representations and critical quantization*

Coauthors: Roman Bezrukavnikov, Dmitriy Rumynin

Lusztig has made a very detailed prediction of the numerical structure of the represntation theory of semisimple Lie algebras in positive characteristic. I will report on verification of Lusztig's conjectures based on the p;oint of view that the complexity of modular representation theory arises from residual commutativity that appears through the failure of quantization at a "critical parameter", which here means at a prime.

**KAILASH C. MISRA**
**North Carolina State University**

*Imaginary Verma modules and Kashiwara algebras for $U_q(\widehat{sl(2)})$*

Coauthors: B. Cox, V. Futorny

We consider imaginary Verma modules for the quantum affine algebra $U_q(\widehat{sl(2)})$ and construct Kashiwara type operators and the Kashiwara algebra $K_q$. Then we show that certain quotient $N_q^-$ is a simple $K_q$-module.

**EVGENY MUKHIN**
**IUPUI**

*Bethe algebras*

Coauthors: V. Tarasov, A. Varchenko

The Bethe algebra of the Gaudin model is an important commutative sugbalgebra of the universal enveloping algebra of the current algebra of gl(N). Acting in various representations of gl(N), the Bethe algebra produces commutative algebras of linear operators which are often naturally identified with the rings of regular functions on affine algebraic varieties. We discuss this construction and its consequences in the case when the affine algebraic variety is the celebrated Calogero-Moser space.

**HIRAKU NAKAJIMA**
**RIMS, Kyoto University**

*Quiver varieties and cluster algebras*

Motivated by a recent conjecture by Hernandez and Leclerc , we embed a Fomin-Zelevinsky cluster algebra into the Grothendieck ring $\mathbf{R}$ of the category of representations of quantum loop algebras $\mathbf{U}_q(\mathbf{L}g)$ of a symmetric Kac-Moody Lie algebra, studied earlier by the author via perverse sheaves on graded quiver varieties. Graded quiver varieties controlling the image can be identified with varieties which Lusztig used to define the canonical base. The cluster monomials form a subset of the base given by the classes of simple modules in $\mathbf{R}$, or Lusztig's dual canonical base. The positivity and linearly independence (and probably many other) conjectures of cluster monomials follow as consequences, when there is a seed with a bipartite quiver. Simple modules corresponding to cluster monomials factorize into tensor products of 'prime' simple ones according to the cluster expansion.

**OLIVIER SCHIFFMANN**
**IMJ, Paris 6**

*Hall algebras of smooth projective curves*

Coauthors: Eric Vasserot

We will present and describe a few basic properties of the Hall algebras of the categories of coherent sheaves on smooth projective curves (e.g. presentation as shuffle algebras), with special emphasis on the case of genus one, which is related to Macdonald theory.

**ANNE SCHILLING**
**UC Davis**

*Kirillov–Reshetikhin crystals for nonexceptional types*

Coauthors: Masato Okado, Ghislain Fourier

We provide combinatorial models for all Kirillov–Reshetikhin crystals of nonexceptional type, which were recently shown to exist. For types $D_n^{(1)}$, $B_n^{(1)}$, $A_{2n-1}^{(2)}$ we rely on a previous construction using the Dynkin diagram automorphism which interchanges nodes 0 and 1. For type $C_n^{(1)}$ we use a Dynkin diagram folding and for types $A_{2n}^{(2)}$, $D_{n+1}^{(2)}$ a similarity construction. We also show that for types $C_n^{(1)}$ and $D_{n+1}^{(2)}$ the analog of the Dynkin diagram automorphism exists on the level of crystals.

This work is based on the preprints G. Fourier, M. Okado, A. Schilling "Kirillov–Reshetikhin crystals for nonexceptional types", preprint arXiv:0810.5067v1 [math.RT], and "Perfectness of Kirillov-Reshetikhin crystals for nonexceptional types", preprint arXiv:0811.1604v1 [math.RT].

**MICHELA VARAGNOLO**
**Universite de Cergy-Pontoise**

*KLR algebras and canonical bases*

Coauthors: Eric Vasserot

I will recall a conjecture by Khovanov and Lauda concerning the categorification of one half the quantum group associated to a simply laced Cartan datum. I will also explain how to prove it.

**ERIC VASSEROT**
**Univ. Paris 7**

*Hall algebras and Hilbert schemes*

Coauthors: Olivier Schiffmann

We'll explain how the Elliptic Hall algebra acts on the groups of equivariant K-theory of the punctual Hilbert schemes of the affine plane. The motivation for this comes from the geometric Langlands correspondence for elliptic curves.

**KARI VILONEN**
**Northwestern University**

*Langlands duality for real groups*

Coauthors: Roman Bezrukavnikov

I will discuss representation theory of real groups with emphasis on the Langlands duality.

**WEIQIANG WANG**
**University of Virginia**

*A new approach to the representation theory of Lie superalgebras*

Coauthors: Shun-Jen Cheng and Ngau Lam (Taiwan)

We formulate and establish an equivalence between parabolic categories O of modules of classical Lie superalgebras to their suitable counterparts for classical Lie algebras. As an intermediate step, we establish isomorphic Kazhdan-Lusztig theories between various Lie superalgebras and Lie algebras. This in particular provides a complete solution to the problem of finding all finite-dimensional irreducible characters of the orth-symplectic Lie superalgebras.

## Posters

**IVANA BARANOVIC**
**University of Zagreb**

*Combinatorial bases of Feigin-Stoyanovsky's type subspaces of level $k$ standard modules for $D_4^{(1)}$*

Let $\tilde{\mathfrak{g}}$ be an affine Lie algebra of type $D_\ell^{(1)}$ and $L(\Lambda)$ its standard module of level $k$ with highest weight vector $v_\Lambda$. We define the Feigin-Stoyanovsky's type subspace as

$$W(\Lambda) = U(\tilde{\mathfrak{g}}_1) \cdot v_\Lambda$$

where $\tilde{\mathfrak{g}} = \tilde{\mathfrak{g}}_{-1} \oplus \tilde{\mathfrak{g}}_0 \oplus \tilde{\mathfrak{g}}_1$ is a $\mathbb{Z}$-gradation of $\tilde{\mathfrak{g}}$. Using vertex operators relations we reduce the Poincaré-Birkhoff-Witt spanning set of $W(\Lambda)$ and describe it in terms of so-called difference and initial conditions. We prove the linear independence of this set using the Dong-Lepowsky intertwining operators.

**DUSKO BOGDANIC**
**Mathematical Institute Oxford**

*Transfer of gradings via derived equivalences and $sl_2$-categorification*

In this poster we present how to use the idea of $sl_2$-categorification to transfer gradings between blocks of symmetric groups via derived equivalences. We do this by introducing an $sl_2$-categorification of the Fock space. Tilting complexes that allow us to move between blocks in the same derived equivalence class (i.e., in the same orbit under the action of the affine Weyl group on the Fock space) are constructed. The example of blocks of symmetric groups of weight 2 in characteristic 3 is presented.

**MARK COLARUSSO**
**University of Notre Dame**

*Gelfand-Zeitlin actions on classical groups*

In recent work, Kostant and Wallach construct an integrable system on the Lie algebra $gl(n,\mathbb{C})$ using a Poisson analogue of the Gelfand-Zeitlin subalgebra of the enveloping algebra. They show that the corresponding Hamiltonian vector fields are complete and that their integrals define an action of $\mathbb{C}^{n(n-1)/2}$ on $gl(n,\mathbb{C})$. We refer to this action of $\mathbb{C}^{n(n-1)/2}$ as the Gelfand-Zeitlin action. The orbits of the Gelfand-Zeitlin action of dimension $n(n-1)/2$ are Lagrangian submanifolds of regular adjoint orbits and they form the leaves of a polarization of an open, dense subvariety of the orbit. We describe all orbits of the Gelfand-Zeitlin action of dimension $n(n-1)/2$ and therefore all polarizations of regular adjoint orbits constructed using Gelfand-Zeiltin theory. We also develop an analogous Gelfand-Zeitlin integrable system for complex orthogonal Lie algebras and study the corresponding Gelfand-Zeitlin action on certain regular semisimple elements.

**YASSIR DINAR**
**ICTP & University of Khartoum**

*Classical W-algebras and algebric Frobenius manifolds*

We prove that, the dispersionless limit of the classical $W$-algebra corresponding to the regular nilpotent orbit in a simple Lie algebra, leads to a polynomial Frobenius manifold. After using Dirac reduction, the dispersionless limit of the classical $W$-algebra corresponding to the distinguished subregular nilpotent orbit in a simply laced Lie algebra, leads to an algebraic Frobenius manifold. The algebraic Frobenius manifold in this case is a hypersurfaces in the total space of the semiuniversal deformation of the corresponding simple singularity.

**RJ DOLBIN**
**UC Riverside**

*Ideals in parabolic subalgebras of simple Lie algebras*

Coauthors: Dr. Vyjayanthi Chari, Tim Ridenour

We study adnilpotent ideals of a parabolic subalgebra of a simple Lie algebra. Any such ideal determines an antichain in a set of positive roots of the simple Lie algebra. We give a necessary and sufficient condition for an antichain to determine an adnilpotent ideal of the parabolic. We write down all such antichains for the classical simple Lie algebras and in particular recover the results of D. Peterson.

**DARREN FUNK-NEUBAUER**
**Colorado State University - Pueblo**

*Bidiagonal pairs, tridiagonal pairs, Lie algebras, and quantum groups*

I will define two types of linear algebraic objects called bidiagonal pairs and tridiagonal pairs. Roughly speaking, a bidiagonal (resp. tridiagonal) pair is a pair of diagonalizable linear transformations on a finite dimensional vector space that act bidiagonally (resp. tridiagonally) on each others eigenspaces. I will describe how to classify the bidiagonal pairs using the Lie algebra $sl_2$ and the quantum group $U_q(sl_2)$. In particular, the collection of all bidiagonal pairs naturally splits into two classes. The first class can be used to construct all finite dimensional representations of $sl_2$. The second class can be used to construct all finite dimensional representations of $U_q(sl_2)$. In an attempt to classify the tridigaonal pairs I will describe how tridiagonal pairs are connected to the quantum group $U_q(\widehat{sl}_2)$. In particular, a certain type of tridiagonal pair can be used to construct all finite dimensional irreducible representations of $U_q(\widehat{sl}_2)$. I will also briefly mention some other Lie algebras and quantum groups which are connected to the study of tridiagonal pairs.

**JAN GRABOWSKI**
**University of Oxford**

*Examples of quantum cluster algebras related to partial flag varieties*

We give several explicit examples of quantum cluster algebra structures, as introduced by Berenstein and Zelevinsky, on quantized coordinate rings of partial flag varieties and their associated unipotent radicals. These structures are quantizations of the cluster algebra structures found on those objects by Geiß, Leclerc and Schröer. We also exhibit quantum cluster algebra structures in the dual picture, on certain subalgebras of quantized enveloping algebras that play the role of quantized enveloping algebras of the Lie algebras of the unipotent radicals.

**NICOLAS GUAY**
**University of Alberta**

*Representations of double affine Lie algebras and finite groups*

Coauthors: David Hernandez, Sergey Loktev

There is no general theory for matrix Lie algebras over non-commutative rings, but there are some interesting examples to consider. Motivated by Cherednik algebras and symplectic reflection algebras, one is led to the study of $\mathfrak{sl}_n$ over rings such as $\mathbb{C}[u, v] \rtimes \Gamma$, where $\Gamma$ is a finite subgroup of $SL_2(\mathbb{C})$, $A_1 \rtimes \Gamma$ where $A_1$ is the first Weyl algebra, and $\Pi(Q)$, the preprojective algebra of a quiver $Q$. I will explain some results regarding integrable modules, Weyl modules and quasifinite highest weight modules when $\Gamma$ is a cyclic group. One can hope that some of these results can be generalized to affine Yangians and new families of quantum algebras called deformed double current algebras.

**ALEXANDER HOFFNUNG**
**University of California, Riverside**

*A categorification of Hecke algebras*

Coauthors: John Baez

Given a Dynkin diagram and the finite field $F_q$, where $q$ is a prime power, we get a finite algebraic group $G_q$. We will show how to construct a categorification of the Hecke algebra $H(G_q)$ associated to this data. This is an example of the Baez/Dolan/Trimble program of "Groupoidification", a method of promoting vector spaces to groupoids and linear operators to spans of groupoids. For example, given the $A_2$ Dynkin diagram, for which $G_q = SL(3,q)$, the spans over the $G_q$-set of complete flags in $F_q^3$ encode the relations of the Hecke algebra associated to $SL(3,q)$. Further, we will see how the categorified Yang-Baxter equation is derived from incidence relations in projective plane geometry.

**MIROSLAV JERKOVIC**
**University of Zagreb**

*Character formulas for Feigin-Stoyanovsky's type subspaces of standard* $\widetilde{\mathfrak{sl}(3,\mathbb{C})}$*-modules*

For affine Lie algebra $\tilde{\mathfrak{g}}$ of type $A_\ell^{(1)}$ observe the $\mathbb{Z}-$grading $\tilde{\mathfrak{g}} = \tilde{\mathfrak{g}}_{-1} \oplus \tilde{\mathfrak{g}}_0 \oplus \tilde{\mathfrak{g}}_1$ induced by suitably chosen $\mathbb{Z}-$grading of the underlying simple finite dimensional Lie algebra $\mathfrak{g}$.

Define *Feigin-Stoyanovsky's type subspace* of a standard $\tilde{\mathfrak{g}}$-module $L(\Lambda)$ as $W(\Lambda) = U(\tilde{\mathfrak{g}}_1) \cdot v_\Lambda$, where $U(\tilde{\mathfrak{g}}_1)$ is the universal enveloping algebra of $\tilde{\mathfrak{g}}_1$, and $v_\Lambda$ fixed highest weight vector of $L(\Lambda)$.

For affine Lie algebra $\widetilde{\mathfrak{sl}(3,\mathbb{C})}$, we obtain fermionic-type character formulas for all $W(\Lambda)$ at general integer level.

**KINVI KANGNI**
**University of Cocody-Abidjan; Cte d'Ivoire**

*Delta invariant integral on reductive Lie group.*

Let $G$ be a locally compact group, $K$ a compact subgroup and $\delta$ an element of unitary dual of $K$. In this work, we have established some relations between $\delta$-orbital integral, $\delta$-Abel transformation and $\delta$-invariant integral of Harish Chandra on reductive Lie group; given a characterization of these kind of integral and studied some of its properties.

**JUANA SNCHEZ ORTEGA**
**Universidad de Mlaga**

*Natural questions concerning Lie algebras of quotients*

Coauthors: Matej Bresar, Francesc Perera, Mercedes Siles Molina

A notion of algebra of quotient of a Lie algebra was introduced by M. Siles Molina. We extend such notion to the more general case of graded Lie algebras. We analyze the relationship between Jordan pairs of quotients and (graded) Lie algebras of quotients. We also study whether some important properties of associative quotients are valid in the context of Lie algebras.

**TANUSREE PAL**
**Harish-Chandra Research Institute, Allahabad, India**

*Representations of Lie tori of type $A_l$ coordinated by cyclotomic quantum tori*

Coauthors: Punita Batra

Let $sl_{l+1}(C_q)$ be a Lie tori of type $A_l$ coordinated by a cyclotomic quantum tori $C_q$ of rank greater than equal to two. Using the representation theory of finitedimensional modules for the multiloop Lie algebras, we present a classification of the finitedimensional irreducible $sl_{l+1}(C_q)$-modules.

**TIM RIDENOUR**
**University of California, Riverside**

*Rigid subsets of weights for simple Lie algebras*

Let $\mathfrak{g}$ be a simple Lie algebra over $\mathbb{C}$. Let $wt(V)$ be the set of weights for a finite dimensional $\mathfrak{g}$-module, $V$. A subset $S$ of $wt(V)$ is said to be rigid if $\sum_{\beta\in S} r_\beta\beta = \sum_{\mu\in wt(V)} m_\alpha\alpha$ with $r_\beta$, $m_\alpha \in \mathbb{Z}^+$ for all $\beta \in S, \alpha \in wt(V)$ implies $\sum_{\beta\in S} r_\beta \leq \sum_{\alpha\in wt(V)} m_\alpha$ with equality holding if and only if $m_\alpha = 0$ for all $\mu \notin S$. I will discuss the classification of rigid subsets for irreducible $\mathfrak{g}$-modules and describe some properties which relate rigid sets to the weight polytope of $V$.

**AHMET SEVEN**
**Middle East Technical University**

*Cluster algebras and generalized Cartan matrices of affine type*

Cluster algebras are a class of commutative rings, introduced by Fomin and Zelevinsky, with connections to many different areas of mathematics. There are fundamental theorems which give an analogy between cluster algebras and Kac-Moody algebras. For example, both theories have the same classification of finite type objects by Cartan-Killing types. However the underlying combinatorics is different: Kac-Moody algebras are associated with (symmetrizable) generalized Cartan matrices while cluster algebras are defined by skew-symmetrizable matrices. In this talk, we will discuss an interplay between these two classes of matrices, establishing the skew-symmetrizable matrices determined by generalized Cartan matrices of affine type.

**ARMIN SHALILE**
**Mathematical Institute, University of Oxford, United Kingdom**

*On the center of the Brauer algebra and modular character theory*

In this poster we exhibit a combinatorial framework to compute a basis for the center of the Brauer algebra over arbitrary fields. We then show how to use this framework to reformulate and extend the known character theory for Brauer algebras, eventually leading us to the definition of an analogue of Brauer characters. As an application we show how to use central characters to determine the blocks of the Brauer algebra over fields of positive characteristic.

**MEINARDI VANESA**
**Ciudad Universitaria, Crdoba , Argentina**

*QHWR of the Lie subalgebra of type orthogonal of matrix differential operators on the circle.*

Coauthors: Boyallian Carina

In this paper classify the irreducible quasifinite highest weight modules of the orthogonal Lie subalgebra of the Lie algebra of matrix differential operators on the circle and construct them in terms of representations theory of the complex Lie algebra $g\ell_\infty^{[m]}$ of infinite matrices with finite number of non-zero diagonals over the algebra $R_m = \mathbb{C}[u]/(u^{m+1})$ and its subalgebras of type B and D.