

INdAM Intensive research period  
**Perspectives in Lie Theory**

Program of activities

**Session 1: Vertex algebras, W-algebras, and applications**

Period: December 9, 2014 – January 18, 2015

**Tuesday, December 9, 2014**

- 14:00 Registration and welcome coffee.
- 15:00 - 17:00, Victor Kac, *Introduction to vertex algebras, Poisson vertex algebras, and integrable Hamiltonian PDE*, lecture 1.

**Wednesday, December 10, 2014**

- 11:00 - 12:00, Jethro Van Ekeren, *Jacobi Invariance of SUSY Vertex Algebras*.
- 15:00 - 17:00, Fyodor Malikov, *Introduction to algebras of chiral differential operators*, lecture 1.

**Thursday, December 11, 2014**

- 15:00 - 17:00, Victor Kac, *Introduction to vertex algebras, Poisson vertex algebras, and integrable Hamiltonian PDE*, lecture 2.

**Friday, December 12, 2014**

- 11:00- 12:00, Daniele Valeri, *Classical W-algebras and generalized Drinfeld-Sokolov hierarchies*.
- 15:00 - 17:00, Fyodor Malikov, *Introduction to algebras of chiral differential operators*, lecture 2.

**Monday, December 15, 2014**

- 15:00 - 17:00, Fyodor Malikov, *Introduction to algebras of chiral differential operators*, lecture 3.

**Tuesday, December 16, 2014**

- 10:00 - 12:00, Tomoyuki Arakawa, *Introduction to W-algebras and their representation theory*, lecture 1.
- 15:00 - 17:00, Victor Kac, *Introduction to vertex algebras, Poisson vertex algebras, and integrable Hamiltonian PDE*, lecture 3.

**Wednesday, December 17, 2014**

- 11:00- 12:00, Anne Moreau, *The symmetric invariants of centralizers and Slodowy grading*.
- 15:00 - 17:00, Fyodor Malikov, *Introduction to algebras of chiral differential operators*, lecture 4.

**Thursday, December 18, 2014**

- 10:00 - 12:00, Victor Kac, *Introduction to vertex algebras, Poisson vertex algebras, and integrable Hamiltonian PDE*, lecture 4.
- 15:00 - 17:00, Fyodor Malikov, *Introduction to algebras of chiral differential operators*, lecture 5.

**Friday, December 19, 2014**

- 15:00 - 17:00, Tomoyuki Arakawa, *Introduction to W-algebras and their representation theory*, lecture 2.

**Monday, December 22, 2014**

- 15:00 - 17:00, Fyodor Malikov, *Introduction to algebras of chiral differential operators*, lecture 6.

**Tuesday, December 23, 2014**

- 10:00 - 12:00, Tomoyuki Arakawa, *Introduction to W-algebras and their representation theory*, lecture 3.

**Monday, January 12, 2015**

- 11:00- 12:00, Drazen Adamovic, *C2 cofinite vertex algebras and representations of affine vertex algebras*.
- 15:00 - 17:00, Tomoyuki Arakawa, *Introduction to W-algebras and their representation theory*, lecture 4.

**Tuesday, January 13, 2015**

- 11:00- 12:00, Pierluigi Moseneder, *Finite vs infinite decompositions in conformal embeddings*.
- 15:00 - 17:00, Tomoyuki Arakawa, *Introduction to W-algebras and their representation theory*, lecture 5.

**Wednesday, January 14, 2015**

- 11:00- 12:00, Masahiko Miyamoto, *Vertex Operator Algebra and Simultaneous Inversion*
- 15:00 - 17:00, Victor Kac, *Introduction to vertex algebras, Poisson vertex algebras, and integrable Hamiltonian PDE*, lecture 5.

**Thursday, January 15, 2015**

- 11:00- 12:00, Yongchang Zhu,  *$\beta$ - $\gamma$  vertex algebras and symplectic loop groups*
- 15:00 - 17:00, Victor Kac, *Introduction to vertex algebras, Poisson vertex algebras, and integrable Hamiltonian PDE*, lecture 6.

**Friday, January 16, 2015**

- 11:00- 12:00, Sylvain Carpentier, TBA.
- 15:00 - 17:00, Tomoyuki Arakawa, *Introduction to W-algebras and their representation theory*, lecture 6.

## Session 2: Winter School: Lie Theory and Representation Theory, (Tentative schedule)

*This session is organized in the framework of the Summer and Winter Schools of the University of Padova.*

Period: January 19 – February 6, 2015

### Monday, January 19, 2015

- 9:00, Registration
- 10:00- 12:00, Geordie Williamson, *An illustrated guide to perverse sheaves*, lecture 1.
- 14:00- 16:00, Alexander Premet, *Finite W-algebras, primitive ideals and modular representations*, lecture 1.
- 16:30 Discussion and Problem session

### Tuesday, January 20, 2015

- 10:00- 12:00, Vera Serganova, *Representations of Lie superalgebras* lecture 1.
- 14:00-14:45 Jing-Song Huang, *Dirac cohomology in representation theory*
- 15:00-15:45 Paul Levy, *Dual singularities in exceptional type nilpotent cones*
- 16:30 Discussion and Problem session

### Wednesday, January 21, 2015

- 10:00- 12:00, Geordie Williamson, *An illustrated guide to perverse sheaves*, lecture 2.
- 14:00- 16:00, Alexander Premet, *Finite W-algebras, primitive ideals and modular representations*, lecture 2.
- 16:30 Discussion and Problem session

### Thursday, January 22, 2015

- 10:00- 12:00, Vera Serganova, *Representations of Lie superalgebras* lecture 2.
- 14:00-14:45, Rudolf Tange, *Highest weight vectors and transmutation*
- 15:00-15:45, Nicolas Libedinsky, *TBA*
- 16:30 Discussion and Problem session

### Friday, January 23, 2015

- 10:00- 12:00, Geordie Williamson, *An illustrated guide to perverse sheaves*, lecture 3.
- 14:00-14:45, Donna Testerman, *Distinguished unipotent elements and multiplicity free subgroups*.
- 15:00, Discussion and Problem session

### Monday, January 26, 2015

- 10:00- 12:00, Geordie Williamson, *An illustrated guide to perverse sheaves*, lecture 4.
- 14:00- 16:00, Vera Serganova, *Representations of Lie superalgebras* lecture 3.
- 16:30 Discussion and Problem session

### Tuesday, January 27, 2015

- 10:00- 12:00, Alexander Premet, *Finite W-algebras, primitive ideals and modular representations*, lecture 3
- 14:00-14:45, Peng Shan, *On the centre of quiver Hecke algebras*
- 15:00-15:45, Gunter Malle
- 16:30 Discussion and Problem session

### Wednesday, January 28, 2015

- 10:00- 12:00, Geordie Williamson, *An illustrated guide to perverse sheaves*, lecture 5.
- 14:00- 16:00, Vera Serganova, *Representations of Lie superalgebras* lecture 4.
- 16:30 Discussion and Problem session

### Thursday, January 29, 2015

- 10:00- 12:00, Alexander Premet, *Finite W-algebras, primitive ideals and modular representations*, lecture 4.
- 14:00-14:45, Maria Chlouveraki, *The Yokonuma-Hecke algebra of type A*
- 16:30 Discussion and Problem session

### Friday, January 30, 2015

- 10:00- 12:00, Geordie Williamson, *An illustrated guide to perverse sheaves*, lecture 6.
- 14:00-14:45, Oksana Yakimova, *On symmetric invariants of semi-direct products*
- 15:00, Discussion and Problem session

### Monday, February 2, 2015

#### Special activity: **A Cluster Algebras Day**

Speakers: Clair Amiot, Jan Geunenich, Philipp Lampe, Alfredo Najera Chavez, Yann Palu, Pierre-Guy Plamondon, Charlotte Riche, Sarah Scherotzke.

### Tuesday, February 3, 2015

- 10:00 - 12:00, Vera Serganova, *Representations of Lie superalgebras* lecture 5.
- 14:00-14:45, Stéphane Gaussent, *Hecke algebras for Kac-Moody groups over local fields*
- 15:00-15:45, Guido Pezzini, *Spherical subgroups of Kac-Moody groups*
- 16:30 Discussion and Problem session

### Wednesday, February 4, 2015

#### Special activity: **A Super Quantum Lie Day**

Speakers: Ivan Angiono, Meng Kiat Chuah, Ulrich Kraehmer, Stephane Launois, Vera Serganova.

### Thursday, February 5, 2015

- 10:00- 12:00, Alexander Premet, *Finite W-algebras, primitive ideals and modular representations*, lecture 5.
- 14:00 - 16:00, Vera Serganova, *Representations of Lie superalgebras* lecture 6.
- 16:30 Discussion and Problem session

**Friday, February 6, 2015**

- 10:00 -12:00, Alexander Premet, *Finite W-algebras, primitive ideals and modular representations*, lecture 6.
- 14:00, Evaluation of the Winter School

**Session 3: Algebraic topology, geometric and combinatorial group theory**

Period: February 8 – February 28, 2015

**Monday, February 9, 2015**

- 9:00- 10:40, Vic Reiner, *Reflection groups and finite general linear groups*, lecture 1.
- 10:40, coffee break.
- 11:10- 12:50, Ulrike Tillmann, TBA, lecture 1.
- 15:00- 16:00, Michael Falk, *An equivariant model for complexified arrangements*.
- 16:00, coffee break.
- 16:30- 17:30, Max Wakefield, TBA.

**Tuesday, February 10, 2015**

- 9:50-10:40, Ulrike Tillmann, TBA, lecture 1.
- 10:40, coffee break.
- 11:10- 12:50, Karen Vogtmann, *On the cohomology of automorphism groups of free groups*, lecture 1.
- 15:00- 16:00, Alexandru Dimca, *Syzygies and geometry of hypersurfaces* .
- 16:00, coffee break.
- 16:30- 17:30, Tony Bahri, TBA.

**Wednesday, February 11, 2015**

- 9:00- 10:40, Vic Reiner, *Reflection groups and finite general linear groups*, lecture 2.
- 10:40, coffee break.
- 11:10- 12:50, Ulrike Tillmann, TBA, lecture 2.
- 15:00- 16:00, Karola Meszaros, TBA.
- 16:00, coffee break.
- 16:30- 17:30, Matthias Lenz, TBA.

**Thursday, February 12, 2015**

- 10:40, coffee break.
- 11:10- 12:50, Karen Vogtmann, *On the cohomology of automorphism groups of free groups*, lecture 2.
- 15:00- 16:00, Ivan Marin, TBA.
- 16:00, coffee break.
- 16:30- 17:30, Masahiko Yoshinaga, TBA.

**Friday, February 13, 2015**

- 9:50-10:40, Ulrike Tillmann, TBA, lecture 3.
- 10:40, coffee break.
- 9:00- 10:40, Vic Reiner, *Reflection groups and finite general linear groups*, lecture 3.
- 11:10- 12:50, Ulrike Tillmann, TBA, lecture 1.

**Monday, February 16, 2015**

- 10:40, coffee break.
- 11:10- 12:50, Karen Vogtmann, *On the cohomology of automorphism groups of free groups*, lecture 3.

**Workshop: Combinatorics and Algebraic Topology of Configurations – February 17-20, 2015**

**Tuesday, February 17, 2015**

- 9:30-10:10, Toshitake Kohno, *Conformal blocks and homological representations of braid groups*.
- 10:10, coffee break.
- 10:40- 11:20, Daniel Matei, TBA.
- 11:30-12:10, Takuro Abe, TBA.
- 14:30-15:10, Luis Paris, *Convexity of parabolic subgroups in Artin groups*.
- 15:10, coffee break.
- 15:40-16:20, Michael Farber, TBA.

**Wednesday, February 18, 2015**

- 9:30-10:10, Emanuele Delucchi, TBA.
- 10:10, coffee break.
- 10:40-11:20, Mattias Franz, TBA.
- 11:30-12:10, Karim Adiprasito, TBA.

**Thursday, February 19, 2015**

- 9:30-10:10, Federico Ardila, TBA.
- 10:10, coffee break.
- 10:40- 11:20, Michelle Wachs, TBA.
- 11:30-12:10, Bruno Benedetti, TBA.
- 14:30-15:10, Caroline Klivans, TBA.
- 15:10, coffee break.
- 15:40-16:20, Mario Marietti, *Special matchings and Kazhdan-Lusztig polynomials*.

**Friday, February 20, 2015**

- 9:30-10:10, Andrew Berget, TBA.
- 10:10, coffee break.
- 10:40- 11:20, Alexander Engstrom, TBA.
- 11:30-12:10, Andrzej Weber, *Characteristic classes for Schubert varieties and torus action.*
- 14:30-15:10, Eric Babson, TBA.
- 15:10, coffee break.
- 15:40-16:20, Thomas Brady, TBA.

**Monday, February 23, 2015**

- 11:00- 12:00, Alejandro Adem, TBA.
- 14:30- 15:30, Alex Fink, TBA.
- 15:30, coffee break.
- 16:00- 17:00, Dmitry Feichtner-Kozlov, TBA.

**Tuesday, February 24, 2015**

- 11:00- 12:00, Alexandru Suciu, TBA.
- 14:30- 15:30, Mike Davis, *The action dimension of right-angled Artin groups.*
- 15:30, coffee break.
- 16:00- 17:00, Sergey Yuzvinsky, *Higher topological complexity of arrangement complements.*

**Wednesday, February 25, 2015**

- 11:00- 12:00, Stefan Papadima, *Arithmetic properties of homology jump loci.*
- 14:30- 15:30, Pavle Blagojević, TBA.
- 15:30, coffee break.

**Thursday, February 26, 2015**

- 11:00- 12:00, Suyoung Choi, *The cohomology ring of small covers and its torsion;*
- 14:30- 15:30, Simona Settepanella, TBA.
- 15:30, coffee break.
- 16:00- 17:00, Eva Maria Feichtner, TBA.

**Friday, February 27, 2015**

- 11:00- 12:00, Graham Denham, TBA.
- 14:30- 15:30, Afshin Goodarzi, TBA.
- 15:30, coffee break.