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Academic positions

RIMS, Kyoto University, Japan, Associate Professor, October 2010– present.

Nara Women's University, Japan, Associate Professor, April 2005–October 2010.

Nagoya University, postdoctoral position, April 1999–March 2005.

Visiting positions

MIT, USA, Visiting Associate Professor, February 2016–present.

Instituto de Matemática e Estatística/IME/USP, São Paulo, Brazil, November 15, 2015–December 14, 2015.

University of Poitiers, France, Visiting Professor, September 29, 2014 –October 31, 2014.

Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany, Visiting Professor, October 31, 2013–January 28, 2014.

London Mathematical Society Scheme 2, October 9–29, 2011.

The University of Sydney, April 15, 2013–May 15, 2013.

Nagoya University, Visiting Associate Professor, April 1, 2013–March 31, 2007.

Reserch Area

Representation theory, vertex algebras

Education

Ph.D. Mathematics, Nagoya University, 1999.

Advisor: Tsuchiya Akihiro.

M.A. Mathematics, Nagoya University, 1995.

B.S. Mathematics, Kyoto University, 1993.

Honors & Awards

2013 Algebra Prize, Mathematical Society of Japan.

2008 The Young Scientists' Prize, The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology of Japan.

2004 Takebe Katahiro Prize, Mathematical Society of Japan.

Grants

JSPS Grant-in-Aid for challenging Exploratory Research No. 26610006, "Geometric methods in vertex algebras", 2014–2016 (4,030,000JPY).

JSPS Grant-in-Aid for Scientific Research (B) No. 25287004, "New developments in representation theory of W -algebras", 2013–2017 (14,820,000JPY).

JSPS Grant-in-Aid for challenging Exploratory Research No. 23654006, "New developments of vertex algebra theory", 2011–2013 (3,640,000JPY).

JSPS Grant-in-Aid for Scientific Research (B) No. 20340007, "A comprehensive research of vertex algebras, especially the W -algebras", 2008–2012 (17,030,000JPY).

JSPS Grant-in-Aid for Young Scientists (B) No. 17740006, "Field theory and representation theory", 2005–2007 (3,500,000JPY).

Refereed papers

1. (with A. Molev) Explicit generators in rectangular affine W -algebras of type A , *Lett. Math. Phys.*, published online.
2. (with A. Moreau) Joseph ideals and lisse minimal W -algebras, *J. Inst. Math. Jussieu*, published online.
3. Rationality of admissible affine vertex algebras in the category \mathcal{O} , *Duke Math. J.*, Volume 165, Number 1 (2016), 67-93.
4. (with H. Yamada and H. Yamauchi) Vertex operator algebras associated with $\mathbf{Z}/k\mathbf{Z}$ -codes, *Springer Proceedings in Mathematics & Statistics*, Vol. 191, 513-521.
5. (with W. Wang) Modular affine vertex algebras and baby Wakimoto modules, *Proceedings of Symposia in Pure Mathematics*, Volume 92 (2016), 1-16.
6. Rationality of W -algebras; principal nilpotent cases, *Ann. Math.* 182 (2015), 565-604.
7. (with T. Kuwabara and F. Malikov) Localization of affine W -algebras, *Comm. Math. Phys.*, April 2015, Volume 335, Issue 1, pp 143-182.
8. Associated varieties of modules over Kac-Moody algebras and C_2 -cofiniteness of W -algebras, *Int. Math. Res. Not.* (2015) Vol. 2015 11605–11666.
9. Two-sided BGG resolutions of admissible representations, *Represent. Theory* 18 (2014), 183-222.
10. (with C.-H. Lam and H. Yamada) Zhu's algebra, C_2 -algebra and C_2 -cofiniteness of parafermion vertex operator algebras, *Adv. Math.*, vol. 264 (2014), 261–295.

11. Rationality of Bershadsky-Polyakov vertex algebras, *Comm. Math. Phys.*, October 2013, Volume 323, Issue 2, pp 627-633.
12. W-algebras at the critical level, *Contemp. Math.*, 565, 1–14, 2012.
13. (with P. Fiebig) The linkage principle for restricted critical level representations of affine Kac-Moody algebras, *Compos. Math.*, 148, 1787–1810, 2012.
14. (with F. Malikov) A chiral Borel-Weil-Bott theorem, *Adv. Math.*, 229 (2012) 2908-2949.
15. A remark on the C_2 -cofiniteness condition on vertex algebras, *Math. Z.* vol. 270, no. 1-2, 559-575, 2012.
16. (with P. Fiebig) On the restricted Verma modules at the critical level, *Trans. Amer. Math. Soc.* 364 (2012), 4683-4712.
17. (with D. Chebotarov and F. Malikov) Algebras of twisted chiral differential operators and affine localization of \mathfrak{g} -modules, *Sel. Math. New Ser.*, vol.17, no. 1, 1-46, 2011.
18. Representation theory of W-algebras, II, *Adv. Stud. Pure Math.* 61(2011), 51–90.
19. Representation Theory of W-Algebras, *Invent. Math.*, Vol. 169 (2007), no. 2, 219–320.
20. A New Proof of the Kac-Kazhdan Conjecture, *Int. Math. Res. Not.* 2006. Art. ID 27091, 5 pages.
21. Representation Theory of Superconformal Algebras and the Kac-Roan-Wakimoto Conjecture, *Duke Math. J.*, Vol. 130 (2005), No. 3, 435-478.
22. Vanishing of cohomology associated to quantized Drinfeld-Sokolov reduction, *Int. Math. Res. Not.* 2004, no. 15, 730–767.
23. Drinfeld functor and finite-dimensional representations of Yangian, *Comm. Math. Phys.* 205 (1999), no. 1, 1–18.
24. (with T. Suzuki) Duality between $sl_n(C)$ and the degenerate affine Hecke algebra, *J. Algebra* 209 (1998), no. 1, 288–304.
25. (with T. Suzuki and A. Tsuchiya) Degenerate double affine Hecke algebra and conformal field theory. Topological field theory, primitive forms and related topics (Kyoto, 1996), 1–34, *Progr. Math.*, 160, Birkhauser, 1998.
26. (with T. Nakanishi, K. Oshima and A. Tsuchiya) Spectral decomposition of path space in solvable lattice model. *Comm. Math. Phys.* 181 (1996), no. 1, 157–182.

Under review papers and preprints

1. (with A. Premet) Quantizing Mishchenko-Fomenko subalgebras for centralizers via affine W-algebras, arXiv:1611.00852 [math.RT].
2. (with K. Kawasetsu, T. Creutzig and A. Linshaw) Orbifolds and cosets of minimal \mathcal{W} -algebras, arXiv:1610.09348 [math.RT].
3. (with K. Kawasetsu) Quasi-lisse vertex algebras and modular linear differential equations, arXiv:1610.05865 [math.QA], submitted.

4. (with A. Moreau) On the irreducibility of associated varieties of W-algebras, arXiv:1608.03142 [math.RT].
5. (with V. Futorny, L.-E. Ramirez) Weight representations of admissible affine vertex algebras, arXiv:1605.07580 [math.RT].
6. Introduction to W-algebras and their representation theory, arXiv:1605.00138 [math.RT].
7. (with A. Moreau) Sheets and associated varieties of affine vertex algebras, arXiv:1601.05906 [math.RT].
8. (with T. Creutzig and A. Linshaw) Cosets of Bershadsky-Polyakov algebras and rational W-algebras of type A, arXiv:1511.09143 [math.RT].

Talks

Advanced lectures and mini-courses (outside Japan)

- December 2014, January 2015: “Introduction to W-algebras and their representation theory (12 hours lectures)”, *Vertex algebras, W-algebras, and applications*, The Centro di Ricerca Matematica Ennio De Giorgi, Pisa, Italy.
- April 2013: “Introduction to representation theory of W-algebras”, a mini-course lecture, The University of Sydney.
- December 2012: “Affine category \mathcal{O} and representation theory of W-algebras (3 lectures)”, *Category \mathcal{O} : geometry and categorification*, Centre International de Rencontres Mathématiques.
- December 2012: “Recent development in representation theory of W-algebras”, *Algebraic Structures in Integrable Systems (3 lectures)*, Moscow University.
- June 2005: “Representation theory of W-algebras”, mini-course lecture, Schroedinger Institute, Vienna, June 2005.

International Conference talks

1. “Associated varieties of vertex algebras”, “Construction of genus zero chiral algebras of class \mathcal{S} ” (two talks), *Exact Operator Algebras in Superconformal Field Theories*, Perimeter Institute for Theoretical Physics, December 16, Waterloo, Canada.
2. “Moore-Tachikawa conjecture and chiral algebras of class \mathcal{S} ”, plenary talk, *the 60th annual meeting of the Australian Mathematical Society*, December 8, 2016, Australian National University, Canberra, Australia.
3. “On the 2d TQFT associated with vertex algebras,” *Conference in Finite Groups and Vertex Algebras dedicated to Robert L. Griess on the occasion of his 71st birthday*, August 26, 2016, Academia Sinica, Taipei, Taiwan.
4. “Equivariant affine W-algebras”, *Nilpotent Orbits and Representation Theory*, June 16, 2016, The Centro di Ricerca Matematica Ennio De Giorgi (CRM), Pisa, Italy.
5. “Deligne exceptional series, Feigin-Frenkel conjecture, and W-algebras”, *Representation theory and symplectic singularities in honour of Sasha Premet’s 60th birthday*, April 4, 2016, ICMS, Edinburgh, UK.

6. “Modular invariance of trace functions of Kac-Wakimoto admissible representations” *Lie and Jordan algebras, Their representations and Applications VI, dedicated to Efin Zelmanov’s 60th birthday*, December 13–19, 2015, Bento Goncalves, Brazil.
7. “Sheets and affine vertex algebras”, *Vertex operator algebra and Related Topics*, September 10, 2015, Sichuan University, Chengdu, China.
8. “Joseph ideals and lisse minimal W-algebras”, *Summer School and Workshop on Lie Theory and Representation Theory IV*, July 2, 2015, East China Normal University, Shanghai, China.
9. “Admissible representations and minimal models of W-algebras I, II”, *Representation Theory XIV*, July 23 and 25, 2015, Dubrovnik, Croatia.
10. “Trace functions of Kac-Wakimoto admissible representations”, *Taitung Workshop on finite groups, VOA and algebraic combinatorics*, March 08, 2015.
11. “Minimal models of W-algebras”, *Algebraic Lie theory and representation theory*, The International Centre for Mathematical Sciences (ICMS), Edinburgh, UK, September 1, 2014.
12. “Feigin-Frenkel, Adamovic-Milas, and Frenkel-Kac-Wakimoto”, *Workshop “Lie theory and mathematical physics”*, Centre de recherches mathématiques, Université de Montréal, Canada, May 22, 2014.
13. “The Frenkel-Kac-Raul-Wang conjecture and quantized Drinfeld-Sokolov reduction”, *Hualien Workshop on Finite Groups, VOA, Algebra Combinatorics and Related Topics*, National Dong Hua University, Taiwan, March 22, 2014.
14. “W-algebras and Vinberg’s problem for centralizers”, *Symmetries in Mathematics and Physics II in honor of Prof. Victor Kac’s 70th birthday*, IMPA, Rio de Janeiro, Brazil, June 28, 2013.
15. “An application of affine W-algebras”, *Taitung Workshop on group theory, VOA and algebraic combinatorics*, Taitung University, Taiwan, March 27, 2013.
16. “Nilpotent orbits and the Kac-Wakimoto conjecture”, *Conference on Groups, VOAs and Related Structures in Honor of Masahiko Miyamoto*, University of Tsukuba, Japan, September 11, 2012.
17. “Rationality of W-algebras”, *The XXIX International Colloquium on Group-Theoretical Methods in Physics*, Chern Institute of Mathematics Tianjin, China, August 20, 2012.
18. “Rationality of admissible affine vertex algebras in the category O”, *Conference on Vertex Operator Algebras, Finite Groups and Related Topics*, Academia Sinica, Taiwan December 18, 2011.
19. “Localization of affine W-algebras at the critical level”, *Perspectives in Algebraic Lie Theory*, Isaac Newton Institute for Mathematical Sciences, September 15, 2011.
20. “Rationality and smoothness of W-algebras”, *Representation Theory of Algebraic Groups and Quantum Groups*, Nagoya, Japan, August 2, 2010.
21. “Nilpotent orbits and Kac-Wakimoto admissible representations of Kac-Moody algebras”, *The 9th Workshop on Nilpotent Orbits and Representation Theory*, Hokkaido, Japan, February 19, 2010.
22. “Varieties of nilpotent orbits, Kac-Moody algebras, and W-algebras”, *Workshop and Summer School on Lie Theory and Representation Theory II*, East China Normal University, Shanghai, China, July 20, 2009.

23. “Affine W-algebras and Zhu’s Poisson varieties associated with Kac- Moody vertex algebras”, *Algebraic Lie Structures with Origins in Physics*, Isaac Newton Institute for Mathematical Sciences, UK, March 23, 2009.
24. “Chiral differential operators and affine chiralization of \mathfrak{g} -modules ”, *Taipei Workshop in Lie Theory*, Institute of Mathematics, Academia Sinica, Taipei, Taiwan, December 28. 2008.
25. “Representations of W-algebras and conjectures of Kac-Wakimoto”, *Symmetries in Mathematics and Physics to honor the 65th birthday of Prof. Victor G. Kac*, Cortona, Italy, June 24, 2008.
26. “Representations of W-algebras and affine Kac-Moody algebras ”, *Erlangen Representation Theory Days*, Emmy-Noether-Zentrum, Universität Erlangen-Nürnberg, Germany, June 13, 2008.
27. “Representation Theory of W-algebras”, *joint AMS-TMS meeting*, Tunghai University, Taichung, Taiwan, December 15, 2005.
28. “Representation theory of W-algebras”, *International Conference on Algebra in Memory of Kostia Beidar*, National Cheng Kung University, Tainan, Taiwan, March 2005.
29. “Representation theory of \mathfrak{g} -algebras and superconformal algebras”, *International conference on infinite-dimensional Lie theory*, Morningside center of Mathematics Chinese academy of Science, Beijing, China, July 2004.

Colloquium talks

1. “Moore-Tachikawa conjecture and chiral algebras of class \mathcal{S} ”, Sydney-UNSW Joint Colloquium, Nov 25, 2016.
2. “Vertex algebras and symplectic varieties”, *the University of Poitiers*, November 2, 2016.
3. “Vertex algebras and symplectic varieties”, *University of Texas at Arlington*, September 30, 2016.
4. “The Adamović-Milas conjecture and application”, *University of Zagreb*, Croatia, June 1, 2016.
5. “Pentagonal number theorem and representation theory”, *University of Virginia*, USA, April 21, 2016.
6. ”W-algebras and Frenkel- Kac-Wakimoto conjecture”, *Academia Sinica*, Taiwan, March 12, 2015.
7. “W-Algebras as Generalization of Infinite-Dimensional Lie Algebras”, *Friedrich-Alexander-Universität Erlangen-Nürnberg*, Germany, December 3, 2013.
8. “Chiral Hamiltonian reduction and representation theory”, *Nagoya*, Japan, May 11, 2011.
9. “BRST reduction and representation theory of W-algebras”, *RIMS, Kyoto University*, Japan, October 13, 2010.
10. “Character formulae of W-algebras”, *Osaka University*, Osaka, Japan, December 3, 2008.
11. “Quantum BRST reduction and representation theory”, *University of Virginia*, USA, April 5, 2007.
12. “Vertex algebras associated with Slodowy slices”, *RIMS, Kyoto University*, Japan, November 27, 2006.
13. “W-Algebras and their representations”, *Tohoku University*, Sendai, Japan, October 23, 2006.

Other Professional Experience

NSF panelist, Washington DC, January, 2010.

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