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Date of birth: November 2, 1989

Hironori Oya

▬▬▬ Research Area

- ○ Representation theory of Quantum groups
- ○ Cluster algebras

▬▬▬ Languages

- ○ Japanese, English

▬▬▬ Education

Mar. 23 2017 **Ph.D of Mathematical Sciences**, *The University of Tokyo*
Supervisor: Yoshihisa Saito
Ph.D thesis: *Twist maps on quantized coordinate algebras*

Mar. 24 2014 **Master of Mathematical Sciences**, *The University of Tokyo*
Supervisor: Yoshihisa Saito
Master thesis: *A naive construction of irreducible representations of the quantized function algebra* $\mathbb{C}[SL_n]_v$

Mar. 23 2012 **Bachelor of Sciences**, *The University of Tokyo*

▬▬▬ Employment

Oct. 2024 – Present **Associate professor**, *Department of Mathematics, Institute of Science Tokyo*

Aug. 2022 – Sep. 2024 **Associate professor**, *Department of Mathematics, Tokyo Institute of Technology*

Apr. 2021 – Jul. 2022 **Associate professor**, *Department of Mathematical Sciences, Shibaura Institute of Technology*

Sep. 2018 – Mar. 2021 **Assistant professor**, *Department of Mathematical Sciences, Shibaura Institute of Technology*

Sep. 2017 – Aug. 2018 **Post-doctoral researcher**, *CNRS, Université Paris Diderot-Paris VII, Institut de Mathématiques de Jussieu – Paris Rive Gauche*

Apr. 2017 – Sep. 2017 **Part-time lecturer**, *Rikkyo University and Seikei University*

Apr. 2017 – Aug. 2017 **Associate fellow**, *Graduate School of Mathematical Sciences, The University of Tokyo*

Apr. 2015 – Mar. 2017	**JSPS Research Fellowship for Young Scientists (DC2)**, No.15J09231
Nov. 2012 – Mar. 2017	**FMSP Course student**

Honors and Awards

Dec. 2023	**Reiwa 5th year Rigakuin Wakate Kenkyu Shoreisho "令和 5 年度理学院若手研究奨励賞"**, *Tokyo Institute of Technology*
Mar. 2017	**The Graduate School of Mathematical Sciences Dean's Prize (Ph.D course)**, *The University of Tokyo*
Mar. 2014	**The Graduate School of Mathematical Sciences Dean's Prize (Master course)**, *The University of Tokyo*

Grants and Supports

Apr. 2023 – Mar. 2027	**JSPS Grant-in-Aid for Early-Career Scientists**, No.23K12950
Apr. 2019 – Mar. 2023	**JSPS Grant-in-Aid for Early-Career Scientists**, No.19K14515
Sep. 2017 – Aug. 2018	**[Support] The European Research Council under the European Union's Framework Programme H2020 with ERC Grant Agreement number 647353 QAffine**, Principal Investigator: David Hernandez
Apr. 2015 – Mar. 2017	**JSPS Grant-in-Aid for JSPS Research Fellow (DC2)**, No.15J09231
Nov. 2012 – Mar. 2017	**Leading Graduate Course for FMSP**

Papers

1. $\mathscr{A} = \mathscr{U}$ *for cluster algebras from moduli spaces of G-local systems*, joint work with Tsukasa Ishibashi and Linhui Shen, Adv. Math. **431** (2023), Paper No.109256, 50 pp.

2. *Wilson lines and their Laurent positivity*, joint work with Tsukasa Ishibashi, Math. Z. **305**, Article number 34 (2023), 60 pp.

3. *Isomorphisms among quantum Grothendieck rings and propagation of positivity*, joint work with Ryo Fujita, David Hernandez, and Se-jin Oh, J. Reine Angew. Math. **785** (2022), 117–185.

4. *Cluster realizations of Weyl groups and higher Teichmüller theory*, joint work with Rei Inoue and Tsukasa Ishibashi, Selecta Math. (N.S.) **27** (2021), no. 3, Paper No. 37, 84 pp.

5. *Twist automorphisms on quantum unipotent cells and dual canonical bases*, joint work with Yoshiyuki Kimura, Int. Math. Res. Not. IMRN 2021, no. 9, 6772–6847.

6. *Quantum Grothendieck ring isomorphisms, cluster algebras and Kazhdan–Lusztig algorithm*, joint work with David Hernandez, Adv. Math. **347** (2019), 192–272.

7. *The Chamber Ansatz for quantum unipotent cells*, Transform. Groups **24** (2019), no. 1,

193–217.

8. *Quantum twist maps and dual canonical bases*, joint work with Yoshiyuki Kimura, Algebr. Represent. Theory **21** (2018), no. 3, 589–604.

9. *Representations of quantized coordinate algebras via PBW-type elements*, Osaka J. Math **55** (2018), no. 1, 71–115.

10. *A comparison of Newton–Okounkov polytopes of Schubert varieties*, joint work with Naoki Fujita, J. Lond. Math. Soc. (2) **96** (2017), no. 1, 201–227.

Preprints

1. *Isomorphisms among quantum Grothendieck rings and cluster algebras*, joint work with Ryo Fujita, David Hernandez, and Se-jin Oh, arXiv:2304.02562.

2. *Newton–Okounkov polytopes of Schubert varieties arising from cluster structures*, joint work with Naoki Fujita, arXiv:2002.09912.

Talks

1. *Non-trivial birational transformations for the q-characters of representations of quantum affine algebras*, Colloquium in Department of Mathematics, Tokyo University of Science, Apr. 2024.

2. *Relations among the q-characters of simple modules over quantum loop algebras of several Dynkin types*, Integrable Systems and Quantum Groups – In Honor of Masato Okado's 60th Birthday–, Osaka Metropolitan University, Mar. 2023.

3. *Application of cluster structures to the representation theory of quantum loop algebras*, The 18th Algebra-Analysis-Geometry Seminar, Zoom (online), Feb. 2023.

4. *Isomorphisms among quantum Grothendieck rings and their applications*, Representation theory and geometry of loop spaces, Laboratoire de Mathématiques d'Orsay, Jan. 2023.

5. *Wilson lines on the moduli space of G-local systems on a marked surface*, Geometry, Algebra and Physics Seminar at KIAS, KIAS (online), Dec. 2022.

6. *Wilson lines on the moduli space of decorated twisted G-local systems on a marked surface*, Conference on Algebraic Representation Theory 2022 (CART 2022), University of Tsukuba, Nov. 2022.

7. *Application of cluster structures to representation theory of quantum loop algebras*, Ookayama Colloquium, Tokyo Institute of Technology, Nov. 2022.

8. *Isomorphisms among quantum Grothendieck rings and their applications*, 82nd Colloquium in Department of Mathematical Sciences, Shibaura Institute of Technology, Jul. 2022.

9. *Isomorphisms among quantum Grothendieck rings and their applications*, Quantum Groups and Cluster Algebras, QSMS (online), Feb. 2022.

10. *Isomorphisms among quantum Grothendieck rings and their applications*, Infinite Analysis 21 Workshop Around Cluster Algebras, Zoom (online), Sep. 2021.

11. *Twist maps and their applications*, Invited talk in Infinite Analysis Special Session at MSJ Autumn Meeting 2021, Chiba University (online), Sep. 2021.

12. *Survey of "Reductive groups, the loop Grassmannian, and the Springer resolution" by P. Achar and S. Riche*, Workshop on representation theory of reductive algebraic groups, Zoom

(online), Aug. 2021.

13. *Systematic construction of isomorphisms among quantum Grothendieck rings*, Representation Theory Seminar, RIMS (online), Feb. 2021.

14. *Newton–Okounkov polytopes of Schubert varieties arising from cluster structures and representation-theoretic polytopes*, Séminaire d'Algèbre, Institut Henri Poincaré (online), May 2020.

15. *Cluster algebras and calculation of q-characters of simple modules over quantum loop algebras of non-symmetric type*, Representation Theory of Algebraic Groups and Quantum Groups – in honor of Professor Ariki's 60th birthday –, RIMS, Oct. 2019.

16. *Calculation of the q-characters of simple modules over quantum loop algebras of non-symmetric type*, The 64th Algebra Symposium, Tohoku University, Sep. 2019.

17. *Similarities in representation theory of quantum affine algebras of several different Dynkin types*, The 3rd UOG-SIT Workshop in Pure/Applied Mathematics and Computer Science, University of Guam, Mar. 2019.

18. *Similarities in finite-dimensional representation theory of quantum affine algebras of several different Dynkin types*, Invited talk in Algebra session at MSJ Spring Meeting 2019, Tokyo Institute of Technology, Mar. 2019.

19. *Quantum Grothendieck ring isomorphisms for quantum affine algebras of type* A *and* B, Representation Theory Seminar, RIMS, Dec. 2018.

20. *Quantum Grothendieck ring isomorphisms for quantum affine algebras of type* A *and* B, Conference on Algebraic Representation Theory 2018, Tongji University, Nov. 2018.

21. *Cluster realizations of Weyl groups and their application*, Algebra seminar in South Osaka, I-site Namba, Oct. 2018.

22. *Similarities in the finite-dimensional representation theory for quantum affine algebras of several different types*, 72nd Colloquium in Department of Mathematical Sciences, Shibaura Institute of Technology, Oct. 2018.

23. *Quantum Grothendieck ring isomorphisms for quantum affine algebras of type* A *and* B, Oberseminar Algebra, Universität zu Köln, Jun. 2018.

24. *Quantum Grothendieck ring isomorphisms for quantum affine algebras of type* A *and* B, Séminaire de Théorie des Groupes, Lamfa - Université de Picardie Jules Verne, Jun. 2018.

25. *Quantum Grothendieck ring isomorphisms for quantum affine algebras of type* A *and* B, Algebraic Lie Theory and Representation Theory (ALTReT) 2018, Nagano, May 2018.

26. *Quantum Grothendieck ring isomorphisms for quantum affine algebras of type* A *and* B, Séminaire Groupes, Représentations et Géométrie, Bâtiment Sophie Germain, Mar. 2018.

27. *Twist automorphisms and Chamber Ansatz formulae for quantum unipotent cells*, Séminaire d'Algèbre, Institut Henri Poincaré, Oct. 2017.

28. *The Chamber Ansatz formulae for quantum unipotent cells*, Representation Theory Seminar, RIMS, Jul. 2017.

29. *Twist automorphisms and Chamber Ansatz formulae for quantum unipotent cells*, Ring Theory and Representation Theory Seminar, Nagoya University, Jul. 2017.

30. *Twist automorphisms and Chamber Ansatz formulae for quantum unipotent cells*, Tsukuba Workshop on Pure and Applied Mathematics 2017, University of Tsukuba, Jul. 2017.

31. *Quantum twist automorphisms and quantum Chamber Ansatz formulae for unipotent cells* (poster), Algebraic Analysis and Representation Theory – In honor of Professor Masaki Kashiwara's 70th Birthday –, RIMS, Jun. 2017.

32. *Twist automorphisms on quantum unipotent cells and the Chamber Ansatz*, Algebraic Lie Theory and Representation Theory (ALTReT) 2017, Shizuoka, Jun. 2017.

33. (1) *Total positivity and cluster algebras* (survey), (2) *Quantum twist automorphisms and the Chamber Ansatz*, Langlands and Harmonic Analysis, Shizuoka, Mar. 2017.

34. *Twist maps on quantum unipotent cells and the Chamber Ansatz*, Oberseminar Algebra, Universität zu Köln, Oct. 2016.

35. *Quantum twist maps and dual canonical bases*, Various Issues relating to Representation Theory and Non-commutative Harmonic Analysis, RIMS, Jun. 2016.

36. *Quantum twist maps and dual canonical bases*, Tsukuba Freshman Seminar, University of Tsukuba, Jun. 2016.

37. *On some reducible representations of the quantized coordinate algebras*, 21st Conference on Algebra for Young Researchers in Japan, Nara Women's University, Mar. 2016.

38. *Langlands duality for representations of quantum groups and quantum Frobenius maps* (survey), Langlands and Harmonic Analysis, Kyushu University, Mar. 2016.

39. *Representations of quantized coordinate algebras via PBW-type elements*, Kobe Seminar on Integrable Systems, Kobe University, Jan. 2016.

40. *Relations between quantum groups and quivers via Hall algebras* (survey), Graduate Student Colloquium, Osaka City University, Oct. 2015.

41. *Representations of quantized function algebras and the transition matrices from Canonical bases to PBW bases*, Tsukuba Freshman Seminar, University of Tsukuba, Jul. 2015.

42. *Representations of quantized function algebras and the transition matrices from Canonical bases to PBW bases*, Algebraic Lie theory and Representation theory 2015, Okayama, Jun. 2015.

43. *Representations of quantized function algebras and the transition matrices from Canonical bases to PBW bases*, Shinshu Algebra Seminar, Shinshu University, May. 2015.

44. *The representations of quantized function algebras and the transition matrices between Canonical bases and PBW bases*, MSJ Spring Meeting 2015, Meiji University, Mar. 2015.

45. *Representations of quantized function algebras and the transition matrices from Canonical bases to PBW bases*, Algebra Seminar, Osaka City University, Feb. 2015.

46. *Representations of quantized function algebras and the transition matrices from Canonical bases to PBW bases*, Representation Theory Seminar, RIMS, Feb. 2015.

47. *Representations of quantized function algebras and the transition matrices from Canonical bases to PBW bases*, Lie Groups and Representation Theory Seminar, The University of Tokyo, Jan. 2015.

48. *A construction of irreducible representations of the quantized function algebra $\mathbb{C}[SL_n]_v$*, 17th Conference on Representation Theory of Algebraic Groups and Quantum Groups, Toyama, Jun. 2014.

49. *A construction of irreducible representations of the quantized function algebra $\mathbb{C}[SL_n]_v$*, 19th

Conference on Algebra for Young Researchers in Japan, Shinshu University, Feb. 2014.

50. *A construction of irreducible representations of the quantized function algebra* $\mathbb{C}[SL_n]_v$, Algebra Seminar, Osaka City University, Jan. 2014.

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