

# Masao Oi (大井 雅雄)

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<https://masaooi.github.io>  
(January 16, 2025)

## Academic Positions

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- Assistant Professor (Tenured-track), National Taiwan University, August 2024–
- Assistant Professor (program-specific), Kyoto University, October 2019–July 2024  
Mentor: Atsushi Ichino
- JSPS postdoctoral fellow, Kyoto University, April 2019–September 2019  
Mentor: Atsushi Ichino

## Education

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- Doctor, Mathematical Science, University of Tokyo, April 2016–March 2019  
Thesis: *On depth in the local Langlands correspondence*  
Supervisor: Yoichi Mieda  
Tasho Kaletha (2018 winter; short-term stay at University of Michigan)
- Master, Mathematical Science, University of Tokyo, April 2014–March 2016  
Thesis: *On the endoscopic lifting of simple supercuspidal representations*  
Supervisor: Naoki Imai (April 2014–September 2014),  
Yoichi Mieda (October 2014–March 2016)
- Bachelor, Mathematics, University of Tokyo, April 2010–March 2014

## Research Interests

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- Harmonic analysis and representation theory of reductive groups over local/global fields
- Langlands correspondence and Langlands functoriality

## Grants/Fellowships

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- Yushan Young Fellow (Sciences), August 2024–July 2029.
- JSPS KAKENHI Grant Number: 24K16899, “Generalization of Deligne–Lusztig theory and the local Langlands correspondence”, April 2024–March 2028 (suspended since August 2024).
- JSPS KAKENHI Grant Number: 20K14287, “Study of the Langlands functoriality via an explicit local Langlands correspondence”, April 2020–March 2024.
- JSPS Research Fellow (PD) Grant Number: 19J00846, “Study of the Langlands functoriality via twisted harmonic analysis”, April 2019–September 2019.
- JSPS Research Fellow (DC2) Grant Number: 17J05451, “Study of the Langlands functoriality from the viewpoint of harmonic analysis”, April 2017–March 2019.
- FMSP course student, The Leading Graduate Course for Frontiers of Mathematical Sciences and Physics, September 2014–March 2019.

## Awards

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- Takebe Katahiro Prize for Encouragement of Young Researchers, The Mathematical Society of Japan, September 2019.
- Dean's Award (Doctor's course, valedictorian), Graduate School of Mathematical Sciences, the University of Tokyo, March 2019.
- Dean's Award (Master's course), Graduate School of Mathematical Sciences, the University of Tokyo, March 2016.

## Papers

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### Published or Accepted:

- [1] (with Guy Henniart) *On Swan exponents of symmetric and exterior square Galois representations*, Rad Hrvat. Akad. Znan. Umjet. Mat. Znan. **28** (558) (2024) (special issue for the 70th birthday of Marko Tadić), 151–184.
- [2] (with Guy Henniart) *Simple supercuspidal  $L$ -packets of symplectic groups over dyadic fields*, [arXiv:2207.12985](https://arxiv.org/abs/2207.12985), 26 pages, To appear in Represent. Theory.
- [3] (with Hiraku Atobe and Seidai Yasuda) *Local newforms for generic representations of unramified odd unitary groups and the Fundamental Lemma*, Duke Math. J. **173** (2024), no. 12, 2447–2479.
- [4] (with Charlotte Chan) *Geometric  $L$ -packets of Howe-unramified toral supercuspidal representations*, J. Eur. Math. Soc. (JEMS), 1396 (online first).
- [5] (with Kazuki Tokimoto) *Local Langlands correspondence for regular supercuspidal representations of  $GL(n)$* , Int. Math. Res. Not. IMRN (2021), no. 3, 2007–2073.
- [6] (with Ryotaro Sakamoto and Hiroyoshi Tamori) *Iwahori–Hecke algebra and unramified local  $L$ -functions*, Math. Z. **303** (2023), no. 3, Paper No. 59, 42 pp.
- [7] *Simple supercuspidal  $L$ -packets for quasi-split classical groups*, Mem. Amer. Math. Soc. **297** (2024), no. 1483, v+161.
- [8] *Depth preserving property of the local Langlands correspondence for non-quasi-split unitary groups*, Math. Res. Lett. **28** (2021), no. 1, 175–211.
- [9] *Depth preserving property of the local Langlands correspondence for quasi-split classical groups in a large residual characteristic*, Manuscripta Math. **171** (2023), no. 3-4, 529–562.
- [10] *Unramified base change of simple supercuspidal  $L$ -packets of quasi-split classical groups*, Algebraic Number Theory and Related Topics 2017, RIMS Kôkyûroku Bessatsu B83 (2020), 061-081.
- [11] *Endoscopic lifting of simple supercuspidal representations of unramified  $U(N)$  to  $GL(N)$* , Publ. Res. Inst. Math. Sci. **55** (2019), 895-938.
- [12] *Endoscopic lifting of simple supercuspidal representations of  $SO(2n+1)$  to  $GL(2n)$* , Amer. J. Math., **141** (2019), 169-217.

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### Preprints:

- [13] *Twisted endoscopic character relation for toral supercuspidal  $L$ -packets of classical groups*, 127 pages, preprint, available at <https://www.math.kyoto-u.ac.jp/~masaooi/TECR.pdf>.

- [14] (with Moshe Adrian, Guy Henniart, and Eyal Kaplan) *Simple supercuspidal  $L$ -packets of split special orthogonal groups over dyadic fields*, [arXiv:2305.09076](#), 52 pages, preprint (submitted).
- [15] (with Charlotte Chan) *Characterization of supercuspidal representations and very regular elements*, [arXiv:2301.09812](#), 75 pages, preprint (submitted).
- [16] (with Alexander Bertoloni Meli) *The  $B(G)$ -parametrization of the local Langlands correspondence*, [arXiv:2211.13864](#), 40 pages, preprint (submitted).

## Talks in Seminars/Workshops/Conferences

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- (1) 2025 TMS Annuar TMS meeting, National Central University (Taiwan), January 15, 2025.
- (2) NCTS One-Day Workshop on Number Theory, National Tsing Hua University (Taiwan), December 18, 2024.
- (3) Pan Asia Number Theory Conference 2024, VIASM (Vietnam), July 15-19, 2024.
- (4) Kagura-zaka algebra seminar, Tokyo University of Science, May 23, 2024.
- (5) NTU Mathematics Colloquium, December 27, 2023.
- (6) Algebraic Number Theory and Related Topics 2023, RIMS, December 12, 2023.
- (7) BIRS-IASM workshop "Arthur packets", Hangzhou, China, November 7, 2023.
- (8) Representations of reductive  $p$ -adic groups,  $L$ -functions and relative matters: a conference in honor of Guy Henniart, Amiens University, France, September 13, 2023.
- (9) The 5th Japan-Taiwan Number theory conference, Penghu University of Science and Technology (PUST), August 22, 2023.
- (10) RIMS workshop "Recent developments in representation theory and related topics", RIMS, June 20, 2023.
- (11) Ehime University Algebra Seminar (online), June 24, 2023.
- (12) Number Theory in Tokyo, Tokyo Institute of Technology, March 24, 2023.
- (13) Mini-workshop on the geometrization of the local Langlands correspondences and related topics, Kyoto University, December 23, 2022.
- (14) Group, Lie and Number Theory, University of Michigan, October 24, 2022.
- (15) 11th Kurashiki Number Theory Meeting, Kurashiki Seaside Hotel, September 11-12, 2022.
- (16) Revisiting Some Aspects of the Works of Harish-Chandra and Weil, NUS, Singapore, July 5, 2022.
- (17) The 7th KTGU Mathematics Workshop for Young Researchers, Kyoto University (online), February 14, 2022.
- (18) RIMS conference: Automorphic forms, automorphic  $L$ -functions, and its related topics, RIMS (online), January 27, 2022.
- (19) POSTECH-PMI number theory seminar, online, December 23, 2021.
- (20) The 9th East Asia Number Theory Conference, online, August 26, 2021.
- (21) Keio algebra seminar, Keio University (online), August 2, 2021.

- (22) Automorphic Project & Research Seminar, online, May 14, 2021.
- (23) RIMS conference: Automorphic forms, automorphic representations, Galois representations, and its related topics, RIMS (online), January 29, 2021.
- (24) MIT Lie Groups Seminar, MIT (online), December 2, 2020.
- (25) Kobe number theory mini-workshop, Kobe University (online), November 19, 2020.
- (26) 65th Symposium of Algebra, Chiba University (online), September 4, 2020.
- (27) Number theory seminar, Kyoto University (online), May 22, 2020.
- (28) Kyoto University Colloquium, Kyoto University, January 15, 2020.
- (29) Mathematics seminar, KIAS, January 6, 2020.
- (30) 22nd Hakuba Autumn Workshop on Number Theory "Application of Arthur's multiplicity formula to Siegel modular forms", November 2, 2019.
- (31) Oberwolfach workshop "New Developments in Representation Theory of p-adic Groups", Oberwolfach, October 1, 2019.
- (32) Regulators in Niseko 2019, Hilton Niseko Village, Hokkaido, September 9, 2019.
- (33) 10th Kurashiki Number Theory Meeting, Kurashiki Seaside Hotel, July 26, 2019.
- (34) Workshop on Shimura varieties, representation theory, and related topics, Hokkaido University, July 18, 2019.
- (35) Number theory seminar, Kyoto University, April 12, 2019.
- (36) Workshop on arithmetic geometry, Tokyo-Princeton at Komaba, the University of Tokyo, March 20, 2019.
- (37) On the Langlands Program: Endoscopy and Beyond, National University of Singapore, December 26, 2018.
- (38) Kagawa Seminar, Kagawa university, October 21, 2018.
- (39) 9th Kurashiki Number Theory Meeting, Kurashiki Seaside Hotel, September 19, 2018.
- (40) The 4th Japan-Taiwan Joint Conference on Number Theory, Campina Hotel, Fukue, Goto-city, September 3, 2018.
- (41) 17th Sendai-Hiroshima Workshop on Number theory, Tohoku University, July 13, 2018.
- (42) 5th Kyoto conference on automorphic forms, Kyoto University, June 29, 2018.
- (43) Mathematical Society of Japan Spring Meeting 2018, the University of Tokyo, March 18, 2018.
- (44) Algebraic Number Theory and Related Topics 2017, RIMS, December 6, 2017.
- (45) 8th Kurashiki Number Theory Meeting, Kurashiki Seaside Hotel, July 24-25, 2017.
- (46) 4th Kyoto conference on automorphic forms, Kyoto University, June 17, 2017.
- (47) On the endoscopic character relation, Kinoshita seminar 2017, Kinoshita, Japan, February 15, 2017.
- (48) Automorphic forms and related topics, RIMS, February 10, 2017.
- (49) Number theory seminar, Waseda University, January 20, 2017.

- (50) Representation theory seminar, Hokkaido University, January 17, 2017.
- (51) Workshop on Shimura varieties, representation theory and related topics, Kyoto University, November 22, 2016.
- (52) 7th Kurashiki Number Theory Meeting, Kurashiki Seaside Hotel, July 21-22, 2016.
- (53) 15th Sendai-Hiroshima Workshop on Number theory, Tohoku University, July 14, 2016.
- (54) Number theory seminar, Kyoto University, May 13, 2016.
- (55) Number theory seminar, the University of Tokyo, April 27, 2016.
- (56) Algebra seminar, Tohoku University, April 21, 2016.
- (57) Langlands and Harmonic Analysis, Kyushu University, March 7, 2016.

## Conferences/Workshops I have (co-)organized

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- (1) NCTS One-Day Workshop on Arithmetic and Algebraic Geometry, National Taiwan University, Taiwan, February 20, 2025.
- (2) “Arithmetic Geometry and Representation Theory”, Toyama, Japan, December 16–18, 2019.

## Teaching Experiences

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### Lectures

- (1) Spring 2025, “Introduction to the local Langlands correspondence”, National Taiwan University.
- (2) Fall 2024, “Representation theory of finite groups of Lie type”, National Taiwan University.
- (3) Winter 2023, “Linear Algebra B”, Kyoto University.
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### Teaching Assistant

- (4) Winter 2018, Teaching assistant, “Algebra (Representation Theory)”, University of Tokyo.
- (5) Winter 2017, Teaching assistant, “Algebra (Representation Theory)”, University of Tokyo.
- (6) Winter 2016, Teaching assistant, “Calculus”, University of Tokyo.
- (7) Summer 2016, Teaching assistant, “Calculus”, University of Tokyo.
- (8) Summer 2016, Teaching assistant, “Linear Algebra”, University of Tokyo.
- (9) Winter 2014, Teaching assistant, “Algebra III (Galois Theory)”, University of Tokyo.
- (10) Summer 2014, Teaching assistant, “Algebra I (Group Theory)”, University of Tokyo.

## References

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I have asked the following professors to write a recommendation letter in my past applications:

- Atsushi Ichino (Kyoto University)
- Tamotsu Ikeda (Kyoto University)
- Tasho Kaletha (University of Michigan)
- Yoichi Mieda (University of Tokyo)
- Sug Woo Shin (UC Berkeley)