CURRICULUM VITAE

TAKAHIKO YOSHIDA

1. Personal

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Citizenship: Japanese

2. Degree

Ph.D.: (Mathematical science), March 2003, the University of Tokyo.
Thesis title: *Quantization of the moduli space of flat connections on a punctured Riemann surface based on symplectic geometry*
Supervisor: Toshitake Kohno
M.A.: March 1999, the University of Tokyo.
Master thesis title: *The generating function for certain cohomology intersection pairings of the moduli space of flat connections*
Supervisor: Toshitake Kohno
A.B.: March 1997, Tohoku University

3. Employment and Research Fellowship

April 2025 - Present: Department of Mathematics, School of Science and Technology, Meiji University, Associate professor
April 2012 - March 2024: Department of Mathematics, School of Science and Technology, Meiji University, Senior assistant professor
Sep 2011 - March 2012: Department of Mathematics, School of Engineering, Tokyo denki University, Assistant professor
April 2010 - Aug 2011: Meiji University, Meiji Institute of Advanced Study of Mathematical Sciences, Postdoctoral Fellow
April 2008 - March 2010: Meiji University, Advanced Graduate Program in Mathematical Sciences, Postdoctoral Fellow
April 2007 - March 2008: The University of Tokyo, The 21st Century COE (Center of Excellence) program, Postdoctoral Fellow

Date: 9 April, 2025.

April 2004 - March 2007: The University of Tokyo, Japan Society of the promotion Science, Research Fellowship for Young Scientists (JSPS Postdoctoral Fellow)
Sep 2003 - March 2004: The University of Tokyo, The 21st Century COE (Center of Excellence) program, Postdoctoral Fellow
June 2002 - March 2003: The University of Tokyo, Research Assistant

4. Teaching Experience

April 2012 - Present: Meiji University, probability, calculus for undergraduate students, curves and surfaces, fundamental groups and covering spaces, fundations of differential manifolds
Sep 2011 - March 2012: Tokyo Denki University, linear algebra, differential geometry, and multi-valuable calculus for undergraduate students
April 2004 - Aug 2011: Meiji University, multi-variable calculus, ordinary differential equations, and Fourier analysis for undergraduate students
April 2002 - March 2005: Tokyo University of Technology, linear algebra and single valuable calculus for undergraduate students

5. Outreach

1. *Geometric methods in Quantization*, Advanced Mathematical Sciences C "Mathematics Everywhere", Project Based Analysis and Research Cluster course, Institute for Advanced Study of Mathematical Sciences, Meiji University

6. Grants

April 2025 - March 2028: Japan Society of the promotion Science Grant-in-Aid for Scientific Research (C) 25K06991
April 2019 - March 2023 (Extended to March 2025): Japan Society of the promotion Science Grant-in-Aid for Scientific Research (C) 19K03479
April 2015 - March 2019 (Extended to March 2020): Japan Society of the promotion Science Grant-in-Aid for Scientific Research (C) 15K04857
April 2012 - March 2015: Japan Society of the promotion Science Grant-in-Aid for Scientific Research (C) 24540095
April 2010 - March 2012: Japan Society of the promotion Science Grant-in-Aid for Young Scientists (B) 22740046
April 2008 - March 2010: Japan Society of the promotion Science Grant-in-Aid for Young Scientists (B) 20740029
April 2004 - March 2007: Japan Society of the promotion Science Research Fellowship for Young Scientists 10136

7. Research interest

Symplectic geometry, especially, geometric quantization and index theory related to geometric quantization

8. Research articles

8.1. **Publications (refereed).**

1. *Adiabatic limit, Theta function, and Geometric quantization*, SIGMA 20 (2024), 065, 52 pages.
2. *RR-BS correspondence – a localization phenomenon of the index in geometric quantization*, SUGAKU exposition 36 (2023), 35-66.
3. *RR-BS correspondence – a localization phenomenon of the index in geometric quantization*, Ronsetsu "Sugaku" 71 (2019), no. 1, 1-30.
4. *Torus fibrations and localization of index III* (with H. Fujita and M. Furuta), Comm. Math. Phys. 327 (2014), issue 3, 665-689.
5. *Torus fibrations and localization of index II* (with H. Fujita and M. Furuta), Comm. Math. Phys. 326 (2014), issue 3, 585-633.
6. *Equivariant local index*, RIMS Kôkyûroku Bessatsu B39 (2013), 215-232.
7. *Local torus actions modeled on the standard representation*, Adv. Math. 227 (2011), no. 5, 1914-1955.
8. *Torus fibrations and localization of index I* (with H. Fujita and M. Furuta), J. Math. Sci, Univ. Tokyo 17 (2010), no. 1, 1-26.
9. *On manifolds which are locally modeled on the standard representation of a torus*, Noncommutativity and Singularities, 353-363. Advanced Studies in Pure Mathematics 55. Mathematical Society of Japan, Tokyo, 2009.
10. *On liftings of local torus actions to fiber bundles*, Toric Topology, 391-402. Edited by M. Harada, Y. Karshon, M. Masuda, T. Panov. Contemp. Math. 460. American Mathematical Society, Providence, RI, 2008.
11. *On the geometric quantization of the moduli space of flat connections on a punctured Riemann surface*, Review Bull.Cal.Math.Soc. 12 (2004), no. 1-2, 97-108.
12. *Symplectic toric space associated to triangle inequalities* (with Y.Kamiyama), Geometriae Dedicata 93 (2002), no. 1, 25-36.
13. *The Generating function for certain cohomology intersection pairings of the moduli space of flat connections*, J. Math. Sci. Univ. Tokyo 8 (2001), no. 3, 541-558.

8.2. **Proceedings.**

14. *Adiabatic limits, theta functions, and geometric quantization*, Deepening and merging geometric structures related to submanifold theory, RIMS Kôkyûroku 2210, 76-84, Kyoto, 2022.
15. *Adiabatic limits, theta functions, and geometric quantization*, Geometry, Algebra and Combinatorics in Transformation group theory, RIMS Kôkyûroku 2098, 35-40, Kyoto, 2018.
16. *Equivariant local index and symplectic cut*, New transformation groups and its related topics, RIMS Kôkyûroku 2016, 161-167, Kyoto, 2016.
17. *RR=# BS via localization of index*, Trends in Mathematics 12 (2010), no. 1, 1-41.

18. *On the existence of symplectic structures compatible with local torus actions*, Proceedings of 34th Symposium on Transformation Groups, 91–96. Wing Co., Ltd., Wakayama, 2007.
19. *On Local torus actions modeled on the standard representation*, The theory of transformation groups and its applications, 94-106. RIMS Kôkyûroku 1569, 94-106, Kyoto, 2007.
20. *Locally standard torus fibrations*, Proceedings of 33rd Symposium on Transformation Groups, 107-118. Wing Co., Ltd., Wakayama, 2007.
21. *Twisted toric structures*, The 2nd COE Conference for Young Researchers, 233-238. Hokkaido University Technical Report Series in Mathematics 104, Hokkaido, 2006.

8.3. **Thesis.**

22. *Quantization of the moduli space of flat connections on a punctured Riemann surface based on symplectic geometry*, the Graduate School of Mathematical Sciences, the University of Tokyo (2003).

8.4. **Preprint.**

23. *Integral-integral affine geometry, geometric quantization, and Riemann-Roch*, 22pages, arXiv:2411.10348v1.
24. *A formula for the equivariant local index of the reduced space in the symplectic cutting*, MIMS Technical Report No. 00044, 2014. 7 pages. Also available at arXiv:1402.6437.
25. *Geodesic flows on spheres and the local Riemann-Roch numbers* (with H. Fujita and M. Furuta), UTMS Preprint Series 2012-12. 12 pages, 2012. Also available at arXiv:1209.2924.
26. RR=# BS via localization of index, MIMS Technical Report No. 00029, 2010. 41 pages.
27. *Acyclic polarizations and localization of Riemann-Roch numbers I* (with H. Fujita and M. Furuta), UTMS Preprint Series 2009-21. 64 pages. It is the old version of *Torus fibrations and localization of index I* which is available at arXiv:0804.3258.
28. *Twisted toric structures*, UTMS Preprint Series 2006-10. 40 pages. Also available at arXiv:math.SG/065376.
29. *Perfect Bott-Morse function on polygon space*, 11 pages, 2000.

9. Talks

9.1. **Invited.**

1. **Geometric quantization of Lagrangian fibrations and adiabatic limits**
   – *The 6th workshop on tropical geometry*, Hiroshima University, 14 March, 2024.
2. **Lattice point counting and Riemann-Roch**
   – *Poisson geometry and its related topics 22*, Tokyo University of Science, 4 December, 2022.
3. **An index theoretic approach to RR-BS**

- *Workshop on Topics in the Geometry and Topology of moduli spaces*, Waseda University, 25 January, 2020.

4. **Does the quantum Hilbert space depend on polarizations?**
   - *Workshop on Topics in the Geometry and Topology of moduli spaces*, Waseda University, 25 January, 2020.
5. **Adiabatic limits, theta functions, and geometric quantization**
   - *RIMS Conference "Deepening and merging geometric structures related to submanifold theory"*, remote, 22 June, 2021.
   - *Mathematical Society of Japan Spring Meeting 2020*, Nihon University, 16 March, 2020.
   - *2019 Canadian Mathematical Society Winter Meeting*, The Chelsea Hotel (Toronto), Canada, 9 December 2019.
   - *Toric Topology 2019 in Okayama*, Okayama University of Science, 20 November, 2019.
   - *The 46th Symposium on Transformation Groups*, Osaka Prefecture University, 1 November, 2019.
   - *Symplectic Geometry Seminar*, University of Toronto, 29 April, 2019.
   - *Geometry and Topology Seminar*, McMaster University, 21 March, 2019.
   - *Symplectic Geometry Seminar*, University of Toronto, 22 October, 2018.
   - *RIMS Conference "Geometry, Algebra and Combinatorics in Transformation Group Theory"*, RIMS (Kyoto), 5 June, 2018.
   - *Toric Topology 2017 in Osaka*, Osaka City University, 13 December, 2017.
6. **Theory of local index and its applications**
   - *Workshop on loop spaces, supersymmetry and index theory*, Chern Institute, Nankai University, 20 July, 2017.
   - *Mito Geometry Seminar*, Ibaraki University, 24 June. 2016.
   - *TMU Geometry Seminar*, Tokyo Metropolitan University, June. 2015.
   - *Differential Geometry, Topology Seminar*, Keio University, December. 2015.
7. **Equivariant local index and symplectic cut**
   - *New transformation groups and its related topics*, RIMS (Kyoto), 24 May 2016.
   - *Conference on Geometry and Quantization 2013*, Erwin Schrödinger Institute for Mathematical Physics (Vienna, Austria), Aug. 2013.
8. **Equivariant local index**
   - *Conference on Geometry and Quantization 2011*, Chern Institute of Mathematics, Nankai University (Tianjin, China), Sep. 2011.
   - *Toric Topology and Automorphic Functions*, Pacific National University (Khabarovsk, Russia), Sep. 2011.
9. **RR=#BS via localization of index** (series of seven lectures)
   - *KAIST Toric Topology Workshop 2010*, KAIST (Daejeon, Korea), Feb. 2010.
10. **Torus fibrations and localization of index**
    - *Mini-workshop on Topological States and Non-commutative Geometry*, WPI-AIMR, Tohoku University (Sendai), Mar. 2015.

- *UK-Japan Mathematical Forum*, Keio University (Yokohama), Jan. 2013.
- *Topology Seminar*, Shinshu University (Matsumoto), Dec. 2012.
- *The international Conference "Geometry, Topology, Algebra and Number theory, Applications"*, Steklov Mathematical Institute of RAS and Moscow State University (Moscow, Russia), Aug. 2010.
- *The 57th geometry symposium in Japan*, Kobe University (Kobe), Aug. 2010.
- *Noncommutative Geometry and Mathematical Physics*, Keio University (Yokohama), Jul. 2010.
- *Workshop on Toric Topology and Related Topics*, Fudan University (Shanghai, China), May 2010.
- *Differential Topology Seminar*, Kyoto University (Kyoto), Apr. 2010.
- *The 36th Symposium on Transformation Groups*, Osaka City University (Osaka), Dec. 2009.
- *Tuesday Seminar on Topology*, the University of Tokyo (Tokyo), Oct. 2009.
- *Geometry for Quantization 2009*, Waseda University (Tokyo), Sep. 2009.

11. **Acyclic polarizations and localization of Riemann-Roch numbers**
    - *Differential Geometry Seminar*, Osaka City University (Osaka), Jun. 2009.
    - *Differential Geometry and Topology Seminar*, Keio University (Yokohama), Jan. 2009.
    - *Geometry Seminar*, National Center for Theoretical Sciences (South) Mathematical Division, (Tainan, Taiwan) Dec. 2008.
    - *Fujisan one-day workshop in Geometry and Topology*, National Center for Theoretical Sciences (South) Mathematical Division, (Tainan, Taiwan) Dec. 2008.
    - *Tokyo Geometry Seminar*, The University of Tokyo (Tokyo), Dec. 2008.
12. **On local torus actions modeled on the standard representation**
    - *Topology Seminar*, Shinshu University (Matsumoto), Feb. 2008.
    - *Tokyo Geometry Seminar*, Tokyo Institute of Technology (Tokyo), Dec. 2007.
13. **Locally standard torus fibrations**
    - *33rd Symposium on Transformation Groups* , Kanagawa Volunteer Support Center (Yokohama), Nov. 2006.
14. **Twisted toric structure**
    - *The 2nd COE Conference for Young Researchers*, Hokkaido University (Sapporo), Feb. 2006.
    - *Topology Seminar*, Tokyo Institute of Technology (Tokyo), Dec. 2005.
    - *Topology Friday Seminar*, Kyusyu University (Fukuoka), Dec. 2005.
15. **On the geometric quantization of the moduli space of flat connections on a Riemann surface with marked points**
    - *The 50th Topology Symposium*, Matsumoto, Jul. 2003.
    - *Tuesday Seminar on Topology*, the University of Tokyo (Tokyo), Jan. 2003.
    - *International Symposium on Pure and Applied Mathematics*, Calcutta Mathematical Society (Calcutta India), Dec. 2002.

16. **Symplectic geometry of the moduli space of flat connections on a punctured Riemann surface**
    – *Noncommutative Geometry and Mathematical Physics*, Keio University (Yokohama), Jun. 2003.
    – *Topology Seminar*, Hokkaido University (Sapporo), Jun. 2003.
    – *Geometry and Physics Seminar*, Waseda University (Tokyo), May. 2003.
17. **On certain cohomology intersection pairings of the moduli space of flat connections on a Riemann surface with marked points**
    – *Symplectic Topology*, Kinosaki, Mar. 2001.
18. **Perfect Bott-Morse function on polygon space**
    – *International Sumposium on Recent Advances in Mathematics and its Applications*, Calcutta Mathematical Society (Calcutta India), Dec. 2003.
19. **Notes on the bending flow on the moduli space of spatial polygons**
    – *Topology related with Riemann surfaces*, Osaka City University (Osaka), Sep. 2000.

9.2. **Others.**

20. **Adiabatic limits, theta functions, and geometric quantization**
    – *Toric Topology 2017 Osaka*, Osaka City University (Osaka), Dec. 2017.
21. **Equivariant local index**
    – *Toric Topology 2011 Osaka*, Osaka City University (Osaka), Nov. 2011.
    – *Geometry of Transformation groups and Combinatorics*, RIMS (Kyoto), 14 June 2011.
    – *Toric geometry, Toric topology and Combinatorics*, Osaka City University (Osaka), Dec. 2010.
22. **Torus fibrations and localization of index**
    – *Third International Conference on Geometry and Quantization*, the University of Luxembourg (Luxembourg), Sep. 2009.
    – *The Mathematical Society of Japan meetings*, Nagoya University (Nagoya), Sep. 2010.
23. **Acyclic polarizations and localization of Riemann-Roch numbers**
    – *Topology from infinite dimensional viewpoint*, Tottori University of Environmental Studies (Tottori), Feb. 2009.
    – *Ikuta International workshop on Symplectic Geometry*, Meiji University (Kawasaki), Dec. 2008.
    – *The Mathematical Society of Japan meetings*, Tokyo Institute of Technology (Tokyo), Sep. 2008.
    – *New Horizons in Toric Topology*, University of Manchester (Manchester, UK), Jul 2008. (poster session)
24. **On counting lattice points and Riemann-Roch numbers in Lagrangian fibrations**

– *Symplectic Geometry Seminar*, University of Toronto (Toronro, Canada), Jan. 2008.

25. **On the existence of symplectic structures compatible with local torus actions**
    – *34th Symposium on Transformation Groups*, Wakayama Municipal Auditorium (Wakayama), Nov. 2007.
26. **Classification of locally toric Lagrangian fibrations**
    – *The Mathematical Society of Japan meetings*, Tohoku University (Sendai), Sep. 2007.
27. **On local torus actions modeled on the standard representation**
    – *The Theory of Transformation Groups and its Applications*, RIMS (Kyoto), 30 May 2007.
    – *The Mathematical Society of Japan meetings*, Saitama University (Saitama), Mar. 2007.
28. **Locally standard torus fibrations**
    – *MSJ-IHES Joint Workshop on Noncommutativity*, IHES (France), 15 Nov. 2006.
29. **Twisted toric structures**
    – *International Conference on Toric Topology*, Osaka City University (Osaka), May 2006.
30. **On the geometric quantization of the moduli space of flat connections on a Riemann surface with marked points**
    – *The Mathematical Society of Japan meetings*, the University of Tokyo (Tokyo), Mar. 2003.
31. **A prequantum line bundle on the moduli space of flat connections on a punctured Riemann surface**
    – *The 10th Japan-Korea school of knots and links*, the University of Tokyo (Tokyo), Feb. 2003.
32. **Perfect Bott-Morse function on polygon space**
    – *Art of Low Dimensional Topology VI*, Kansai seminar house (Kyoto), Jan. 2000.
33. **The generating function for certain cohomology intersection pairings of the moduli space of flat connections on a Riemann surface with marked points and Duistermaat-Heckman's theorem**
    – *The Mathematical Society of Japan meetings*, Hiroshima University (Hiroshima), Sep. 1999.

10. Membership

Mathematical Society of Japan