

# Masahito Hayashi

## Personal

Born on December 28, 1971.

Born in Tokushima, Japan.

Japanese citizen.

## Education

Ph.D. Depart of Mathematics, Graduate School of Science, Kyoto University, 1999 (Supervisor: Prof. Kenji Ueno).

M.A. Depart of Mathematics, Graduate School of Science, Kyoto University, 1996 (Supervisor: Prof. Kenji Ueno).

B.S. Physics & Mathematics, Faculty of Science, Kyoto University, 1994

## Employment (Full time)

Research Fellow, the Japan Society for the Promotion of Science, 1998–2000

Researcher, Laboratory for Mathematical Neuroscience (Amari's Laboratory), Brain Science Institute, RIKEN, 2000–2003

Research Manager, ERATO, Quantum Computation and Information Project, Japan Science and Technology Agency (JST), 2003–2006

Group Leader, Quantum Information Theory Group, ERATO-SORST Quantum Computation and Information Project, Japan Science and Technology Agency (JST), 2006–2007

Associate Professor, Graduate School of Information Sciences, Tohoku University, 2007–2012

Full Professor, Graduate School of Mathematics, Nagoya University, 2012–current.

Chief Research Scientist (PI), Shenzhen Institute for Quantum Science and Engineering, Southern University of Science and Technology 2020–2023.

Full Professor, School of Data Science, The Chinese University of Hong Kong, Shenzhen. 2023–current.

Chief Research Scientist (PI), Shenzhen International Quantum Academy 2023–current.

## Employment (Part time)

Part-time Lecturer (Quantum Information), SOKENDAI (The Graduate University for Advanced Studies), 2002

Adjunct Associate Professor, Superrobust Computation Project, Information Science and Technology Strategic Core (21st Century COE by MEXT), Graduate School of Information Science and Technology, The University of Tokyo, 2004–2007

Visiting Associate Professor, Graduate School of Information Sciences, Tohoku University, 2007

Visiting Research Associate Professor, Centre for Quantum Technologies, National University of Singapore, 2009–2012

Visiting Research Professor, Centre for Quantum Technologies, National University of Singapore, 2012–current.

Visiting Professor, Faculty of Engineering and Information Technology, University of Technology, Sydney, 2013–2014.

Visiting Scientist, Generic Technology Research Group, Center for Advanced Intelligence Project, RIKEN, 2017–2020.

Visiting Professor, Institute for Quantum Science and Engineering, Southern University of Science and Technology (SUSTech), 2018–2020.

Research Scientist, Center for Quantum Computing, Peng Cheng Laboratory, 2019–2020.

## Honors, Awards, & Fellowships

1. 2023: *APS Outstanding Referee. (American Physical Society)*
2. 2023: Selected for *the Annual Science Influence Ranking* and *Lifetime Science Influence Ranking* in Elsevier’s Top 2% Global Scientists Rankings.
3. 2023: Selected as the *Best Scientist in the Field of Mathematics* (43th in China and 890th in the world) and *Best Scientist in the Field of Engineering and Technology* in the top scientists ranking released by Research.com.
4. *2022 Fellow of IMS (Institute of Mathematical Statistics)*: For deep and influential contributions to quantum statistics and quantum information theory.
5. *2022 Fellow of AAIA (Asia Pacific Artificial Intelligence Association)*:
6. *2021, 2022, 2023*: Elsevier Most Cited Chinese Researchers in Physics
7. *2017 IEEE Fellow*: For contributions to Shannon theory, information-theoretic security, and quantum information theory.
8. *12th Japan Academy Medal*: “Information Theory and Quantum Information Theory for Finite-Coding-Length” This prize is awarded by The Japan Academy to up to 6 prestigious Japanese researchers under 45 years old among all scientific areas. Awardees are selected from among the annual recipients of the JSPS Prize.
9. *FY2015 JSPS PRIZE*: “Information Theory and Quantum Information Theory for Finite-Coding-Length” The JSPS PRIZE is meant to recognize at an early stage in their careers young researchers with fresh ideas who have the potential to become world leaders in their fields, while helping to enhance their opportunities to advance their research and make breakthroughs. Twenty-five researchers under 45 years old were selected for this year’s PRIZE. Their fields of research run the spectrum from the humanities and social sciences to the natural sciences.
10. *2011 IEEE Information Theory Society Paper Award*: “Information spectrum approach to second-order coding rate in channel coding” *IEEE Transactions on Information Theory*, Vol. 55, No. 11, 4947–4966 (2009). This prize is the most distinguished paper award in the information theory community.
11. *Senior Member of IEEE*, 2013.
12. *Japan IBM Prize in the Computer Science Section 2010*: “Universal protocol in quantum information and its application to quantum key distribution” This prize is one of the most distinguished prizes in Japan in information science for researchers under 45 across Japan.
13. *Funai Foundation for Information Technology Award in the Computer Science Category 2010*: “Universal quantum information protocol and its application to quantum cryptography”.
14. *Research Fellowship for Young Scientists*, the Japan Society for the Promotion of Science, 1998.

15. *2001 SITA Encouragement Award* (by The Society of Information Theory and its Applications (SITA)): “Variable length universal entanglement concentration by local operations”.
16. *16th TEPIA Video Award, 2006* (by Association for Technological Excellence Promoting Innovative Advances (TEPIA)): This prize is awarded to Public Video for ERATO Quantum computation and information project. I managed the production process as Research Manager.

## Professional Activities

### Steering Committee Member

1. Steering committee chair, Beyond IID in Information Theory conference series, 2023 – Current (Member, 2017 – Current).
2. Steering committee vice chair, Japan Math Contest, 2023 – Current (Member, 2022 – Current).
3. Quantum Information Technology committee member, IEICE (Institute of Electronics, Information and Communication Engineers), 2004 – 2012.

### Editorial Board Member

1. Associate Editor, IEEE Transactions on Information Theory, IEEE, 2024 – Current.
2. Editorial Board Member, New Journal of Physics (NJP), IOP Publishing, 2023 – Current.
3. Editorial Board Member, International Journal of Quantum Information (IJQI) World Scientific, 2002 – Current.
4. Editorial Board Member, Entropy, MDPI, 2020 – Current.

### Organization of International Meetings

1. Organizing Committee Chair: *ERATO Conference on Quantum Information Science 2003 (EQIS 03)*, Doshiha Univ., Kyoto, Japan, September 4-6, 2003.
2. Organizing Committee and Program Committee: *COE Symposium on Quantum Information Theory*, Doshiha Univ., Kyoto, Japan, September 2-3, 2003.
3. Program Committee Vice-Chair: *ERATO Conference on Quantum Information Science 2004 (EQIS 04)*, Hitotsubashi-memorial hall, Tokyo, Japan, September 1–5, 2004.
4. Program Committee Vice-Chair: *ERATO Conference on Quantum Information Science 2005 (EQIS 05)*, JST-Museum Hall, Tokyo, Japan, August 26–30, 2005.
5. Organizing Committee Chair: *COE-Kakenhi Workshop on Quantum Information Theory and Quantum Statistical Inference*, University of Tokyo, Hongo, Tokyo, November 17–18, (2005)
6. Local Committee: *The 8th International Conference on Quantum Communication, Measurement, and Computing (QCMC2006)*, Tsukuba Epocal, Tsukuba, Japan, November 28– December 3, (2006).
7. Program Committee: *Asian Conference on Quantum Information Science 2006 (AQIS06)*, Beijing, China, September 1–4, 2006.
8. Technical Program Committee, *The First International Workshop on Quantum Security (QSEC2007)*, Guadeloupe, French Caribbean, France, January 2–6, 2007. Organized by IEEE France and IARIA.
9. Organizing Committee Chair: *Special seminar series on quantum information*, National Institute of Informatics (NII), Tokyo, February 1 – March 21, 2007.

10. Program Committee: *The 3rd Workshop on Theory of Quantum Computation, Communication, and Cryptography (TQC2008)*, The University of Tokyo, Tokyo Japan, January 30 – February 1, 2008.
11. Technical Program Committee Co-Chair: *ICQNM 2008, The Second International Conference on Quantum, Nano, and Micro Technologies*, Sainte Luce, Martinique, France, February 10–15, 2008. Organized by IEEE France and IARIA.
12. Main Organizer: *GSIS & DEX-SMI Workshop on Quantum statistical inference and entanglement* Graduate School of Information Sciences, Tohoku University, February, 11–12, 2008
13. International Advisory Committee: *International School and Conference on Quantum Information (ISCQI - 2008)*, Institute of Physics (IOP), Bhubaneswar, Orissa, India, March 4–12, 2008
14. Program Committee: *Asian Conference on Quantum Information Science 2008 (AQIS08)*, Souel, Korea, August 25–26, 2008.
15. Organizing Committee: *International Workshop on Statistical-Mechanical Informatics 2008 (IW-SMI2008)*, Sendai, Japan, September 14–17, 2008.
16. Organizing Committee Chair: *GSIS Workshop on Quantum Information Theory*, Sendai, Japan, November 5–7, 2008
17. Organizing Committee: *Multicritical Behaviour of Spin Glasses and Quantum Error Correcting Codes (MBQEC)*, Centennial Hall, Ookayama campus, Tokyo Institute of Technology, Tokyo, Japan, November 17–19 (2008)
18. Organizing committee chair: *DEX-SMI workshop on quantum statistical inference*, National Institute of Informatics (NII), Tokyo, Japan March, 2–4 (2009).
19. Program Committee: *ICQNM 2009, The Third International Conference on Quantum, Nano and Micro Technologies*, Cancun, Mexico, February 1–6 (2009)
20. Program Committee: *Workshop on Theory of Quantum Computation, Communication, and Cryptography (TQC2009)*, Waterloo, Canada, May 11–13 (2009)
21. Program Committee: *ICQNM 2010, The Fourth International Conference on Quantum, Nano and Micro Technologies*, St. Maarten, Netherlands Antilles, February 10–16 (2010).
22. Program Committee (Special Area Chair): *ICQNM 2011, The Fifth International Conference on Quantum, Nano and Micro Technologies*, Nice, France, August 21–27 (2011).
23. Technical Program Committee: *ICQNM 2012, The Sixth International Conference on Quantum, Nano and Micro Technologies*, Rome, Italy, August 19–24 (2012)
24. Program Committee: *12th Asian Quantum Information Science conference (AQIS12)*, School of Physical Science and Technology, Soochow University, Suzhou, China, August 23–26 (2012).
25. Workshop Co-chair: *Japan-Singapore Workshop on Multi-user Quantum Networks*, Centre for Quantum Technologies, National University of Singapore, Singapore, September 17 – 20 (2012)
26. Special Area Chair: *ICQNM 2013, The Seventh International Conference on Quantum, Nano and Micro Technologies*, Barcelona, Spain, August 25 – 31 (2013)
27. Program Committee: *13th Asian Quantum Information Science conference (AQIS 13)*, IMSC Chennai, India, August 25–30 (2013)
28. Program Committee: *The 7th International Conference on Information Theoretic Security (ICITS)*, NTU, Singapore, November, 28–30 (2013)
29. Program Committee: *2014 International Symposium on Information Theory (ISIT)*, Honolulu, Hawaii, June 29 – July 4 (2014)

30. Program Committee: *14th Asian Quantum Information Science conference (AQIS 14)*, Kyoto, Japan, August 21–25 (2014)
31. Special Area Chair: *ICQNM 2014, The Eighth International Conference on Quantum, Nano and Micro Technologies*, Lisbon, Portugal, November 16 – 20 (2014)
32. Program Committee: *The 9th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC2014)*, National University of Singapore, Singapore, May, 21-23 (2014)
33. Organizer: *Australia-Japan Workshop on Multi-user Quantum Networks*, University of Technology, Sydney, October, 22–24 (2014)
34. Program Committee: *Quantum Information Processing (QIP 2015)*, Sydney January (2015)
35. Program Committee: *2015 International Symposium on Information Theory (ISIT)*, Hong Kong, June 14–19 (2015)
36. Special Area Chair: *ICQNM 2015, The Seventh International Conference on Quantum, Nano and Micro Technologies*, Venice, Italy, August 23 - 28, 2015.
37. Program Committee: *2015 IEEE Information Theory Workshop (ITW)*, Jeju Island, Korea, October 11-15, 2015.
38. Special Area Chair: *ICQNM 2016, The Tenth International Conference on Quantum, Nano and Micro Technologies*, Nice, France, July 24 - 28, 2016.
39. Program Committee: *16th Asian Quantum Information Science conference (AQIS'16)*, Academia Sinica, Taipei, Taiwan, August 29-September 1, 2016.
40. Conference Co-Organizer: *Beyond I.I.D. in Information Theory 2017*, Institute for Mathematical Sciences, National University of Singapore, Singapore, July 24-28, 2017
41. Steering Committee: *ICQNM 2017, The Tenth International Conference on Quantum, Nano and Micro Technologies*, Rome, Italy, September 10 - 14, 2017.
42. Program Committee: *10th International Conference on Information Theoretic Security (ICITS)*, Hong Kong, China, on November 29 - December 2, 2017.
43. Program Committee: *Quantum Information Processing 2018 (QIP)*, Aula Congress Centre, the TU Delft, The Netherlands, January 15 - 19, 2018.
44. Program Committee: *2018 International Symposium on Information Theory (ISIT)*, Vail Cascade, CO, USA, June 17 - 22, 2018.
45. Program Committee: *The 13th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC2018)*, University of Technology, Sydney, July, 16–18, 2018.
46. Technical Program Committee: *2018 The International Symposium on Information Theory and Its Applications (ISITA)*, Singapore, October 28–31, 2018, 2018.
47. Organizer: Nagoya-SUSTech Quantum Information Workshop, Nagoya, Japan, April 11 – 13, 2019.
48. Program Committee: *2019 International Symposium on Information Theory (ISIT)*, Paris, France, July, 7 – 12, 2019.
49. Steering Committee: *ICQNM 2019, The Thirteenth International Conference on Quantum, Nano and Micro Technologies*, Nice, France, October 27 – 31, 2019.
50. Organizing Committee: *Quantum Information Processing in Non-Markovian Quantum Complex Systems*, Nagoya, Japan, December 9 – 12, 2019.

51. Local Organizing Committee: *Quantum Information Processing 2020 (QIP)*, Shenzhen, China, January 6 – 10, 2020.
52. Technical Program Committee: *2020 The International Symposium on Information Theory and Its Applications (ISITA)*, Kapolei, Hawaii, USA, October 24-27, 2020. (Online)
53. Workshop Organizer: *SUSTech-Nagoya workshop on Quantum Science 2021*, Shenzhen, China, June 21 – 24, 2021. (Online)
54. Technical Program Committee: WS-15: Workshop on Short Packet Communications for 6G Mission-Critical Applications *IEEE International Conference on Communications (ICC'22)*, Seoul, South Korea, 16–20 May 2022. (Hybrid: In-Person and Virtual Conference)
55. Workshop Organizer: *SUSTech-Nagoya workshop on Quantum Science 2022*, Shenzhen, China, May 31 – June 3, 2022. (Online)
56. Mini Symposium Organizer: *International Symposium on Orthogonal Polynomials, Special Functions and Applications (OPSFA)*, Montreal, Canada, June 13-17, 2022 (online)
57. Program Committee Chair: *Beyond IID workshop 10*, Shenzhen, China, September 26 – 30, 2022. (Online)
58. Technical Program Committee: WS-15: Workshop on Satellite Mega-Constellations in the 6G Era (6GSatComNet'23). *IEEE International Conference on Communications (ICC'23)*, Rome, Italy, 28 May – 1 June 2023. Sustainable Communications for Renaissance
59. Workshop Organizer: *Shenzhen-Nagoya workshop on Quantum Science 2023*, Nagoya, Japan and Shenzhen, China, September 5 – 8, 2023. (Hybrid)
60. Technical Program Committee Co-chair: *2024 IEEE Information Theory Workshop (ITW)*, Shenzhen, China, 2024.
61. Technical Program Committee: *ACM SIGMETRICS / IFIP Performance 2024*, Venice, Italy, June 10 – 14, 2024.
62. Technical Program Committee: WS-15: Workshop on Satellite Mega-Constellations in the 6G Era (6GSatComNet'24). *IEEE International Conference on Communications (ICC'24)*, Denver, CO USA, 9 June - 13 June 2024.
63. Program Committee: *2024 International Symposium on Information Theory (ISIT)*, Athens, Greek, July, 7 – 12, 2024.

## Review Committee for PhD Thesis

1. 2005, Review Committee Member for Two Ph.D. Candidates, Graduate School of Information Science and Technology, The University of Tokyo, Japan.
2. 2006, Review Committee Member for a Ph.D. Candidate, Graduate School of Information Science and Technology, The University of Tokyo, Japan.
3. 2008, External examiner (referent), Faculty of Mathematics and Natural Sciences, University of Leiden, Netherlands
4. 2008, External examiner, National Institute of Education, Nanyang Technological University, Singapore.
5. 2008, External examiner, Department of Communication and Integrated Systems, Graduate School of Science and Engineering, Tokyo Institute of Technology.
6. 2012, External examiner, School of Computer Science, McGill University, Canada.

7. 2013, External examiner, Graduate School of Information Sciences, Tohoku University, Japan.
8. 2014, External examiner, Department of Electrical and Computer Engineering, National University of Singapore, Singapore.
9. 2016, Review Committee Member for a Ph.D. Candidate, Graduate School of Mathematics, Nagoya University, Japan.
10. 2017, Review Committee Member for a Ph.D. Candidate, Graduate School of Mathematics, Nagoya University, Japan.
11. 2023, External examiner, Department of Quantum Science, Australian National University.

### **Other Kinds of Review Committees**

1. 2012, External Reviewer of TATA INSTITUTE OF FUNDAMENTAL RESEARCH. (Promotion to Tenured Associate Professor).
2. 2014, External Reviewer of Research Committee, University of Macau (UM) for the 2014 Multi-Year Research Grant (MYRG).
3. 2015, 2017 External Reviewer of Research Committee, the Czech Science Foundation.
4. 2017, 2021 External Reviewer of the executive government agency of National Science Centre, Poland.
5. 2017, External Reviewer of the Computer Science Department and the Physics Department at the University of California at Santa Barbara (Promotion to Full Professor).
6. 2018, 2023, External Reviewer of the Israel Science Foundation (ISF), Israel.
7. 2018, 2020, External Reviewer of the French National Research Agency (ANR), France.
8. 2019, External Reviewer of the main Chilean funding agency, National Fund for Scientific and Technological Development (FONDECYT).
9. 2020, External Reviewer of TATA INSTITUTE OF FUNDAMENTAL RESEARCH. (Promotion to Tenured Professor).
10. 2020, External Reviewer of the REinforcing Women In REsearch (REWIRE) Fellowship Programme of the University of Vienna.
11. 2021 External Reviewer of Austrian Science Fund (FWF) START Programme.
12. 2021, External Reviewer of the Dutch Research Council.
13. 2021, External Reviewer of ECE department at the Indian Institute of Science (IISc), Bangalore, India. (Selection of faculty member).
14. 2022, External Reviewer for Marie Skłodowska Curie COFUND Fellowships (FCFP), The Freiburg Institute for Advanced Studies (FRIAS), University of Freiburg, Germany.
15. 2022, External Reviewer for SNSF Quantum transitional call 2022, Swiss National Science Foundation, Swiss.
16. 2023, External Reviewer of Austrian Science Fund (FWF), Erwin Schroedinger Fellowship.
17. 2023, External Reviewer of National Research, Development and Innovation Office, Hungary.
18. 2023, External Reviewer of Japan Science and Technology Agency, ERATO program.

## Other professional activities

1. I am one of founders of the *Asian Conference on Quantum Information Science (AQIS)* conference series, which is a major international conference series on quantum information and computation.
2. As Research Manager, I oversaw the ERATO Quantum Computation and Information Project, which at the time was the largest research group for quantum information and computation in Japan.
3. I have served as a referee for renowned international journals including the following journals  
(journals related Nature) *Nature Photonics*, *Nature Communications*, *Nature Partner Journal Quantum Information*, *Scientific Reports*,  
(Physics) *Physical Review X*, *Physical Review Letters*, *Physical Review A*, *Physical Letters A*, *Journal of Physics A*, *New Journal of Physics*, *Annals of Physics*, *Journal of Statistical Physics*,  
(Mathematical Physics) *Communications in Mathematical Physics*, *Journal of Mathematical Physics*, *Reports on Mathematical Physics*, *Reviews in Mathematical Physics*,  
(IEEE) *Proceedings of the IEEE*, *IEEE Transactions on Information Theory*, *IEEE Transactions on Information Forensics & Security*, *IEEE Transactions on Wireless Communications*, *IEEE Communications Letters*, *IEEE Transactions on Communications*.  
(Other areas) *Annals of Statistics*, *Neurocomputing*,

## Membership of Academic Societies

IEEE (The Institute of Electrical and Electronics Engineers): Fellow.

IMS (Institute of Mathematical Statistics): Fellow.

AAIA (Asia-Pacific Artificial Intelligence Association): Fellow.

The Mathematical Society of Japan.

JPS (The Physical Society of Japan).

IEICE (The Institute of Electronics, Information and Communication Engineers).

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