1   Scholarly books

(1-1) **M. Hayashi**, *Quantum Information Theory: Mathematical Foundation*, *Graduate Texts in Physics*, Springer (2017). (First edition was published from Springer in 2006).

(1-2) **M. Hayashi**, S. Ishizaka, A. Kawachi, G. Kimura, and T. Ogawa, *Introduction to Quantum Information Science*, *Graduate Texts in Physics*, Springer (2014). (Originally published from Kyoritsu Shuppan in 2012 with Japanese.)

(1-3) **M. Hayashi**, *Group Representation for Quantum Theory*, Springer (2017). (Originally published from Kyoritsu Shuppan in 2014 with Japanese.)

(1-4) **M. Hayashi**, *A Group Theoretic Approach to Quantum Information*, Springer (2017). (Originally published from Kyoritsu Shuppan in 2014 with Japanese.)

2   Refereed journal articles

(2-1) **M. Hayashi** and Á. Vázquez-Castro, "Computation-aided classical-quantum multiple access to boost network communication speeds," *Physical Review Applied* (In press).

(2-2) G. Kato, M. Owari, and **M. Hayashi**, "Single-Shot Secure Quantum Network Coding for General Multiple Unicast Network with Free One-Way Public Communication," *IEEE Transactions on Information Theory*, Volume: 67, Issue: 7, 4564 - 4587 (2021).

(2-3) Y. Yang and **M. Hayashi**, "Representation matching for remote quantum computing," *PRX Quantum*, 2, 020327 (2021).

(2-4) S. Song and **M. Hayashi**, "Capacity of Quantum Private Information Retrieval with Colluding Servers," *IEEE Transactions on Information Theory*, Volume: 67, Issue: 8, 5491 – 5508(2021).

(2-5) **M. Hayashi**, "Information Geometry Approach to Parameter Estimation in Hidden Markov Model," *Bernoulli Journal*, (In press).

(2-6) **M. Hayashi** and Á. Vázquez-Castro, "Physical Layer Computation as NOMA for Integrated Wireless Systems," *IEEE Transactions on Communications*, Volume: 69, Issue: 7, 4520 – 4535 (2021).

(2-7) **M. Hayashi**, K. Fang, and K. Wang, "Finite Block Length Analysis on Quantum Coherence Distillation and Incoherent Randomness Extraction," *IEEE Transactions on Information Theory*, Volume: 67, Issue: 6, 3926 – 3944 (2021).

(2-8) K. Wang and **M. Hayashi**, "Permutation Enhances Classical Communication Assisted by Entangled States," *IEEE Transactions on Information Theory*, Volume: 67, Issue: 6, 3905 – 3925 (2021).

(2-9) **M. Hayashi** and N. Cai, "Asymptotically Secure Network Code for Active Attacks" *IEEE Transactions on Communications*, Volume: 69, Issue: 5, 3245 – 3259 (2021).

(2-10) **M. Hayashi** and N. Cai, "Secure non-linear network code over one-hop relay network," *IEEE Journal on Selected Areas in Information Theory* Volume: 2, Issue: 1, 296 - 305 (2021).

(2-11) **M. Hayashi**, T. Wadayama, and Á. Vázquez-Castro, "Secure Computation-and-Forward with Linear Codes," *IEEE Journal on Selected Areas in Information Theory*, Volume: 2, Issue: 1, 139 - 148 (2021).

(2-12) S. Song and **M. Hayashi**, "Capacity of Quantum Symmetric Private Information Retrieval with Collusion of All But One of Servers," *IEEE Journal on Selected Areas in Information Theory* Volume: 2, Issue: 1, 380 - 390 (2021).

(2-13) S. Song and **M. Hayashi**, "Capacity of Quantum Private Information Retrieval with Multiple Servers," *IEEE Transactions on Information Theory*, Volume: 67, Issue: 1, 452 – 463 (2021).

(2-14) **M. Hayashi**, M. Owari, G. Kato, and N. Cai, "Reduction Theorem for Secrecy over Linear Network Code for Active Attacks," *Entropy*, Information Theory, Probability and Statistics Section, Special Issue: Multiuser Information Theory III, **22** (9), 1053 (2020).

(2-15) Y. Yoshida, H. Arai, and **M. Hayashi**, "Perfect discrimination in approximate quantum theory of general probabilistic theories," *Physical Review Letters*, vol. 125, 150402 (2020).

(2-16) Y. Yang, G. Chiribella, and **M. Hayashi**, "Communication cost of quantum processes," *IEEE Journal on Selected Areas in Information Theory, second issue focuses on quantum information science*, vol. 1, no. 2, 387 – 400 (2020).

(2-17) **M. Hayashi** and S. Song, "Quantum state transmission over partially corrupted quantum information network," *Physical Review Research*, **2**, 033079 (2020).

(2-18) A. Anshu, **M. Hayashi**, and N. Warsi, "Secure communication over fully quantum Gel'fand-Pinsker wiretap channel," *IEEE Transactions on Information Theory*, Volume: 66, Issue: 9, 5548 – 5566 (2020).

(2-19) J. Suzuki, Y. Yang, and **M. Hayashi**, "Quantum state estimation with nuisance parameters," *Journal of Physics A: Mathematical and Theoretical*, vol. 53 453001 (2020).

(2-20) S. Takabe, and T. Wadayama, and **M. Hayashi**, "Asymptotic Behavior of Spatial Coupling LDPC Coding for Compute-and-Forward Two-Way Relaying," *IEEE Transactions on Communications*, vol. 68, Issue 7, 4063 – 4072 (2020).

(2-21) **M. Hayashi** and S. Watanabe, "Finite-Length Analyses for Source and Channel Coding on Markov Chains," *Entropy*, Information Theory, Probability and Statistics Section, Special Issue: Finite-Length Information Theory, **22**(4), 460 (2020).

(2-22) Y. Yoshida and **M. Hayashi**, "Asymptotic properties for Markovian dynamics in quantum theory and general probabilistic theories," *Journal of Physics A: Mathematical and Theoretical*, **53**, 215303 (2020).

(2-23) R. Takagi, K. Wang, and **M. Hayashi**, "Application of the resource theory of channels to communication scenarios," *Physical Review Letters*, vol. 124, 120502 (2020).

(2-24) **M. Hayashi** and Á. Vázquez-Castro, "Two-Way Physical Layer Security Protocol for Gaussian Channels," *IEEE Transactions on Communications*, vol. 68, Issue 5, 3068 – 3078 (2020).

(2-25) Z. Yao, Z. Fan, **M. Hayashi**, and W. F. Eddy "Quantifying Time-Varying Sources in Magnetoencephalography – A Discrete Approach," *Annals of Applied Statistics*, vol. 14, No. 3, 1379 –1408 (2020).

(2-26) N. Cai and **M. Hayashi**, "Secure Network Code for Adaptive and Active Attacks with No-Randomness in Intermediate Nodes," *IEEE Transactions on Information Theory*, Volume: 66, Issue: 3, 1428 – 1448 (2020).

(2-27) **M. Hayashi** and Á. Vázquez-Castro, "Physical Layer Security Protocol for Poisson Channels for Passive Man-in-the-middle Attack," *IEEE Transactions on Information Forensics and Security*, Volume: 15, Issue: 1, 2295 – 2305 (2020).

(2-28) S. Song and **M. Hayashi**, "Secure Quantum Network Code without Classical Communication," *IEEE Transactions on Information Theory*, Volume: 66, Issue: 2, 1178 – 1192 (2020).

(2-29) H. Zhu and **M. Hayashi**, "General framework for verifying pure quantum states in the adversarial scenario," *Physical Review A*, vol. 100, 062335 (2019).

(2-30) H. Zhu and **M. Hayashi**, "Efficient Verification of Pure Quantum States in the Adversarial Scenario," *Physical Review Letters*, vol. 123, 260504 (2019).

(2-31) H. Zhu and **M. Hayashi**, "Efficient verification of hypergraph states," *Physical Review Applied*, Vol 12, 054047 (2019).

(2-32) H. Arai, Y. Yoshida, and **M. Hayashi**, "Perfect Discrimination of Non-Orthogonal Separable Pure States on Bipartite System in General Probabilistic Theory," *Journal of Physics A: Mathematical and Theoretical*, Vol. 52, 465304 (2019).

(2-33) Y. Takeuchi, T. Morimae, and **M. Hayashi**, "Quantum computational universality of hypergraph states with Pauli-X and Z basis measurements," *Scientific Reports*, Vol. 9, 13585 (2019).

(2-34) **M. Hayashi** and Y. Takeuchi, "Verifying commuting quantum computations via fidelity estimation of weighted graph states," *New Journal of Physics*, Vol. 21 093060 (2019).

(2-35) K. Wang and **M. Hayashi**, "Optimal verification of two-qubit pure states," *Physical Review A*, Vol 100, 032315 (2019).

(2-36) R. Yaguchi and **M. Hayashi**, "Second Order Analysis for Joint Source-Channel Coding with General Channel and Markovian Source," *IEEE Transactions on Information Theory*, Volume: 65, Issue: 9, 5750 – 5770 (2019).

(2-37) **M. Hayashi**, "Local equivalence problem in hidden Markov model," *Information Geometry*, vol 2, 1 – 42 (2019).

(2-38) H. Zhu and **M. Hayashi**, "Optimal verification and fidelity estimation of maximally entangled states," *Physical Review A*, Vol 99, 052346 (2019).

(2-39) Y. Yang, G. Chiribella, and **M. Hayashi**, "Attaining the Ultimate Precision Limit in Quantum State Estimation," *Communications in Mathematical Physics,* vol. 368(1), 223 – 293 (2019).

(2-40) **M. Hayashi**, S. Vinjanampathy, and L.-C. Kwek, "Resolving unattainable Cramer-Rao bounds for quantum sensors," *Journal of Physics B: Atomic, Molecular and Optical Physics*, vol. 52 015503 (2019).

(2-41) **M. Hayashi**, "Universal channel coding for general output alphabet," *IEEE Transactions on Information Theory*, Volume: 65, Issue: 1, 302 – 321 (2019).

(2-42) A. Vazquez-Castro and **M. Hayashi**, "Physical Layer Security for RF Satellite Channels in the Finite-Length Regime," *IEEE Transactions on Information Forensics and Security*, Volume: 14, Issue: 4, 981 – 993 (2018).

(2-43) **M. Hayashi** and Y. Yoshida, "Asymptotic and non-asymptotic analysis for a hidden Markovian process with a quantum hidden system," *Journal of Physics A: Mathematical and Theoretical*, Volume 51, Number 33, 335304 (2018).

(2-44) Y. Yang, G. Bai, G. Chiribella, and **M. Hayashi**, "Compression for quantum population coding," *IEEE Transactions on Information Theory*, Volume: 64, Issue: 7, 4766 – 4783 (2018).

(2-45) Y. Yang, G. Chiribella, and **M. Hayashi**, "Quantum stopwatch: how to store time in a quantum memory," *Proc. R. Soc. A*, vol. 474, 20170773 (2018).

(2-46) **M. Hayashi** and M. Hajdušek, "Self-guaranteed measurement-based blind quantum computation," *Physical Review A*, Vol. 97, 052308 (2018).

(2-47) H. Zhu, **M. Hayashi**, and L. Chen "Axiomatic and operational connections between the l_1-norm of coherence and negativity," *Physical Review A*, Vol. 97, 022342 (2018).

(2-48) V. Tan and **M. Hayashi**, "Analysis of Remaining Uncertainties and Exponents under Various Conditional Rényi Entropies," *IEEE Transactions on Information Theory*. Volume: 64, Issue:5, 3734 – 3755 (2018).

(2-49) H. Zhu and **M. Hayashi**, "Universally Fisher-symmetric informationally complete measurements," *Physical Review Letters*, Vol.120, 030404 (2018)

(2-50) K. Ito and **M. Hayashi**, "Optimal performance of generalized heat engines with finite-size baths of arbitrary multiple conserved quantities beyond independent-and-identical-distribution scaling," *Physical Review E*, Vol. 97, 012129 (2018).

(2-51) **M. Hayashi** and H. Zhu, "Secure uniform random-number extraction via incoherent strategies," *Physical Review A*, Vol. 97, 012302 (2018).

(2-52) M. Tomamichel and **M. Hayashi**, "Operational Interpretation of Renyi Information Measures via Composite Hypothesis Testing Against Product and Markov Distributions," *IEEE Transactions on Information Theory*, Volume: 64, Issue: 2, 1064 – 1082 (2018).

(2-53) **M. Hayashi** and V. Tan, "Minimum Rates of Approximate Sufficient Statistics," *IEEE Transactions on Information Theory*, Volume: 64, Issue: 2, 875 – 888 (2018).

(2-54) T. Morimae, Y. Takeuchi, and **M. Hayashi**, "Verification of hypergraph states," *Physical Review A*, Vol. 96, 062321 (2017).

(2-55) H. Zhu, **M. Hayashi**, and L. Chen, "Coherence and entanglement measures based on Rényi relative entropies," *Journal of Physics A*, Vol. 50, 475303 (2017).

(2-56) M. Owari, G. Kato, and **M. Hayashi**, "Single-Shot Secure Quantum Network Coding on Butterfly Network with Free Public Communication," *Quantum Science and Technology*, Vol. 3, 014001 (2017).

(2-57) K. Fujii and **M. Hayashi**, "Verifiable fault tolerance in measurement-based quantum computation," *Physical Review A, Rapid Communication*, Vol. 96, 030301(R) (2017).

(2-58) H. Tajima and **M. Hayashi**, "Finite-size effect on optimal efficiency of heat engines," *Physical Review E*, Vol. 96, 012128 (2017).

(2-59) **M. Hayashi** and H. Tajima, "Measurement-based formulation of quantum heat engine," *Physical Review A* Vol.95, No.3, 032132 (2017).

(2-60) **M. Hayashi** and M. Owari, "Tight asymptotic bounds on local hypothesis testing between a pure bipartite state and the white noise state," *IEEE Transactions on Information Theory*, Volume: 63, Issue:6, 4008 – 4036 (2017).

(2-61) C. Hirche, **M. Hayashi**, E. Bagan, and J. Calsamiglia, "Discrimination power of a quantum detector," *Physical Review Letters*, Vol.118, 160502 (2017).

(2-62) R. Matsumoto and **M. Hayashi**, "Universal Secure Multiplex Network Coding with Dependent and Non-Uniform Messages," *IEEE Transactions on Information Theory*, Volume: 63, Issue: 6, 3773 – 3782 (2017).

(2-63) **M. Hayashi**, "Finite-Block-Length Analysis in Classical and Quantum Information Theory," *Proceedings of the Japan Academy, Series B*. Volume 93, Issue 3, 99 – 124 (2017).

(2-64) S. Watanabe and **M. Hayashi**, "Finite-length Analysis on Tail probability for Markov Chain and Application to Simple Hypothesis Testing," *Annals of Applied Probability*, Volume 27, Number 2, 811 – 845 (2017).

(2-65) W. Kumagai and **M. Hayashi**, "Random Number Conversion and LOCC Conversion via Restricted Storage," *IEEE Transactions on Information Theory*, Volume 63, Issue 4, 2504 – 2532 (2017).

(2-66) W. Kumagai and **M. Hayashi**, "Second-Order Asymptotics of Conversions of Distributions and Entangled States Based on Rayleigh-Normal Probability Distributions," *IEEE Transactions on Information Theory*, Volume 63, Issue 3, 1829 – 1857 (2017).

(2-67) **M. Hayashi** and V. Y. F. Tan, "Equivocations, Exponents, and Second-Order Coding Rates Under Various Renyi Information Measures," *IEEE Transactions on Information Theory*, Volume 63, Issue 2, 975 – 1005 (2017).

(2-68) H. Zhu, **M. Hayashi**, and L. Chen, "Universal steering criteria," *Phys. Rev. Lett.*, vol. 116, 070403 (2016).

(2-69) **M. Hayashi**, "Optimal decoy intensity for decoy quantum key distribution," *Journal of Physics A:* vol. 49, 165301 (2016).

(2-70) **M. Hayashi** and S. Watanabe, "Uniform Random Number Generation from Markov Chains: Non-Asymptotic and Asymptotic Analyses," *IEEE Transactions on Information Theory*, Volume 62, Issue 4, 1795 – 1822 (2016).

(2-71) **M. Hayashi** and T. Tsurumaru, "More Efficient Privacy Amplification with Less Random Seeds via Dual Universal Hash Function," *IEEE Transactions on Information Theory*, Volume 62, Issue 4, 2213 – 2232, (2016).

(2-72) **M. Hayashi** and R. Matsumoto, "Secure Multiplex Coding with Dependent and Non-Uniform Multiple Messages," *IEEE Transactions on Information Theory*, Volume 62, Issue 5, 2355 – 2409 (2016).

(2-73) **M. Hayashi**, "Security analysis of epsilon-almost dual universal2 hash functions: smoothing of min entropy vs. smoothing of Renyi entropy of order 2," *IEEE Transactions on Information Theory*, Volume 62, Issue 6, 3451 – 3476 (2016).

(2-74) **M. Hayashi**, H. Tyagi, and S. Watanabe, "Secret Key Agreement: General Capacity and Second-Order Asymptotics," *IEEE Transactions on Information Theory*, Volume 62, Issue 7, 3796 – 3810 (2016).

(2-75) **M. Hayashi** and S. Watanabe, " Information Geometry Approach to Parameter Estimation in Markov Chains," *Annals of Statistics*, Volume 44, Number 4, 1495 – 1535 (2016).

(2-76) **M. Hayashi**, "Fourier Analytic Approach to Quantum Estimation of Group Action," *Communications in Mathematical Physics*, Volunme 347, Nunber 1, 3 – 82 (2016).

(2-77) Y. Yang, G. Chiribella, and **M. Hayashi**, "Optimal compression for identically prepared qubit states," *Physical Review Letters*, vol. 117, 090502 (2016).

(2-78) **M. Hayashi** and M. Tomamichel, "Correlation Detection and an Operational Interpretation of the Renyi Mutual Information," *Journal of Mathematical Physics*, vol. 57, 102201 (2016).

(2-79) **M. Hayashi**, "Quantum wiretap channel with non-uniform random number and its exponent and equivocation rate of leaked information," *IEEE Transactions on Information Theory*, Volume 61, Issue 10, 5595 – 5622 (2015).

(2-80) M. Bloch, **M. Hayashi**, A. Thangaraj, "Error-Control Coding for Physical-Layer Secrecy," *Proceedings of IEEE*, Volume 103, Issue 10, pp. 1725 – 1746 (2015)

(2-81) T. Morimae, **M. Hayashi**, H. Nishimura, K. Fujii, "Quantum Merlin-Arthur with Cliford Arthur," *Quantum Information and Computation*, Volume 15, 1420 – 1430 (2015)

(2-82) **M. Hayashi**, V. Tan, "Asymmetric Evaluations of Erasure and Undetected Error Probabilities," *IEEE Transactions on Information Theory*, Volume 61, Issue 12, 6560 – 6577 (2015).

(2-83) M. Owari, **M. Hayashi**, "Local Hypothesis Testing Between a Pure Bipartite State and the White Noise State," *IEEE Transactions on Information Theory*, Volume 61, Issue 12, 6995 – 7011 (2015).

(2-84) K. Ito, W. Kumagai, **M. Hayashi**, "Asymptotic compatibility between local operations and classical communication conversion and recovery," *Phys. Rev. A,* Vol. 92, 052308 (2015).

(2-85) **M. Hayashi**, T. Morimae, "Verifiable measurement-only blind quantum computing with stabilizer testing," *Phys. Rev. Lett.,* vol. 115, 220502 (2015).

(2-86) **M. Hayashi**, "Precise evaluation of leaked information with secure randomness extraction in the presence of quantum attacker," *Communications in Mathematical Physics*, Vol. 333, No. 1, 335 – 350 (2015).

(2-87) **M. Hayashi**, and R. Nakayama, "Security analysis of the decoy method with the Bennett-Brassard 1984 protocol for finite key lengths," *New Journal of Physics*, **16** 063009 (2014). (This paper was selected in IOPselect.)

(2-88) **M. Hayashi**, "Large deviation analysis for quantum security via smoothing of Renyi entropy of order 2," *IEEE Transactions on Information Theory*, Vol. 60, No. 10, 6702 – 6732 (2014).

(2-89) M. Tomamichel, M. Berta, **M. Hayashi**, "Relating different quantum generalizations of the conditional Renyi entropy," *Journal of Mathematical Physics*, Vol. 55, 082206 (2014).

(2-90) M. Owari, and **M. Hayashi**, "Asymptotic local hypothesis testing between a pure bipartite state and the completely mixed state," *Physical Review A*, Vol. 90, 032327 (2014).

(2-91) W. Kumagai and **M. Hayashi**, "Entanglement concentration is irreversible," *Physical Review Letters*, Vol. 111, No. 13, 130407 (2013).

(2-92) M. Tomamichel and **M. Hayashi**, "A Hierarchy of Information Quantities for Finite Block Length Analysis of Quantum Tasks," *IEEE Transactions on Information Theory*, Vol. 59, No. 11, 7693 – 7710 (2013).

(2-93) **M. Hayashi**, "Tight exponential analysis of universally composable privacy amplification and its applications," *IEEE Transactions on Information Theory*, Vol. 59, No. 11, 7728 – 7746 (2013).

(2-94) T. Tsurumaru and **M. Hayashi**, "Dual universality of hash functions and its applications to quantum cryptography," *IEEE Transactions on Information Theory*, Vol. 59, No. 7, 4700 – 4717 (2013).

(2-95) W. Kumagai and **M. Hayashi**, "Quantum hypothesis testing for quantum Gaussian states: Quantum analogues of χ-square, t and F tests," *Communications in Mathematical Physics*, Vol. 318, No. 2, 535 – 574 (2013).

(2-96) **M. Hayashi** and T. Tsurumaru, "Concise and tight security analysis of the Bennett-Brassard 1984 protocol with finite key lengths," *New Journal of Physics*, Vol. 14, 093014 (2012).

(2-97) L. Chen and **M. Hayashi**, "Nondistillable entanglement guarantees distillable entanglement," *International Journal of Modern Physics B*, Vol. 26, 1243008 (2012).

(2-98) **M. Hayashi**, "Comparison between the Cramer-Rao and the mini-max approaches in quantum channel estimation," *Communications in Mathematical Physics*, Vol. 304, No. 3, 689–709 (2011).

(2-99) **M. Hayashi**, "Exponential decreasing rate of leaked information in universal random privacy amplification," *IEEE Transactions on Information Theory*, Vol. 57, No. 6, 3989–4001 (2011).

(2-100) D. Akimoto and **M. Hayashi**, "Discrimination of the change point in a quantum setting," *Physical Review A*, Vol. 83, No. 5 (2011).

(2-101) **M. Hayashi** and L. Chen, "Weaker entanglement between two parties guarantees stronger entanglement with a third party," *Physical Review A*, Vol. 84, No. 1, 012325 (2011).

(2-102) **M. Hayashi**, "Large deviation theory for non-regular location shift family," *Annals of Institute of Statistical Mathematics*, Vol. 63, No. 4, 689–716 (2011).

(2-103) F. Sakaguchi and **M. Hayashi**, "General theory for integer-type algorithm for higher order differential equations," *Numerical Functional Analysis and Optimisation*, Vol. 32, No. 5, 541–582 (2011).

(2-104) F. Sakaguchi and **M. Hayashi**, "Practical implementation and error bound of integer-type algorithm for higher-order differential equations," *Numerical Functional Analysis and Optimisation*, Vol. 32, No. 12, 1316–1364 (2011).

(2-105) **M. Hayashi**, "Phase estimation with photon number constraint," *Progress of Informatics*, No. 8, 81–87 (2011).

(2-106) **M. Hayashi**, "Universal approximation of multi-copy states and universal quantum lossless data compression," *Communications in Mathematical Physics*, Vol. 293, No. 1, 171–183 (2010).

(2-107) **M. Hayashi**, "Capacity with energy constraint in coherent state channel," *IEEE Transactions on Information Theory*, Vol. 56, No. 8, 4071–4079 (2010).

(2-108) H. Zhu, L. Chen, and **M. Hayashi**, "Additivity and non-additivity of multipartite entanglement measures," *New Journal of Physics*, Vol. 12, 083002 (2010).

(2-109) T. Hashimoto, A. Hayashi, **M. Hayashi**, and M. Horibe, "Unitary-process discrimination with error margin," *Physical Review A*, Vol. 81, 062327 (2010).

(2-110) L. Chen and **M. Hayashi**, "Multi-copy and stochastic transformation of multipartite pure states," *Physical Review A*, Vol. 83, 022331 (2011).

(2-111) **M. Hayashi**, "Limiting behavior of relative Renyi entropy in a non-regular location shift family," *Annals of the Institute of Statistical Mathematics*, Vol. 62, No. 3, 547–569 (2010).

(2-112) **M. Hayashi**, "Two non-regular extensions of large deviation bound," *Communications in Statistics - Theory and Methods*, Vol. 39, No. 8, 1404–1423 (2010).

(2-113) **M. Hayashi**, "Universal coding for classical-quantum channel," *Communications in Mathematical Physics*, Vol. 289, No. 3, 1087–1098 (2009).

(2-114) **M. Hayashi**, "Information spectrum approach to second-order coding rate in channel coding," *IEEE Transactions on Information Theory*, Vol. 55, No. 11, 4947–4966 (2009). (This paper receives *2011 IEEE Information Theory Society Paper Award*.)

(2-115) **M. Hayashi**, "Discrimination of two channels by adaptive methods and its application to quantum system," *IEEE Transactions on Information Theory*, Vol. 55, No. 8, 3807–3820 (2009).

(2-116) H. Imai and **M. Hayashi**, "Fourier analytic approach to phase estimation in quantum systems," *New Journal of Physics*, Vol. 11 No 4, 043034 (2009).

(2-117) **M. Hayashi**, "Group theoretical study of LOCC-detection of maximally entangled state using hypothesis testing," *New Journal of Physics*, Vol. 11, No 4, 043028 (2009).

(2-118) **M. Hayashi**, "Optimal ratio between phase basis and bit basis in quantum key distributions," *Physical Review A*, Vol. 79, 020303(R) (2009).

(2-119) **M. Hayashi**, D. Markham, M. Murao, M. Owari, and S. Virmani, "The geometric measure of entanglement for a symmetric pure state with positive amplitudes," *Journal of Mathematical Physics*, Vol. 50, 122104 (2009).

(2-120) F. Hiai, M. Mosonyi, and **M. Hayashi**, "Quantum hypothesis testing with group symmetry," *Journal of Mathematical Physics*, Vol. 50, 103304 (2009).

(2-121) F. Buscemi, **M. Hayashi**, and M. Horodecki, "Global information balance in quantum measurements," *Physical Review Letters*, Vol. 100, 210504 (2008).

(2-122) **M. Hayashi**, "Second-order asymptotics in fixed-length source coding and intrinsic randomness," *IEEE Transactions on Information Theory*, Vol, 54, No. 10, 4619–4637 (2008).

(2-123) **M. Hayashi**, A. Tomita, and K. Matsumoto, "Statistical analysis of testing of an entangled state based on the Poisson distribution framework," *New Journal of Physics*, Vol. 10, 043029 (2008).

(2-124) M. Owari and **M. Hayashi**, "Two-way classical communication remarkably improves local distinguishability," *New Journal of Physics*, Vol. 10, 013006 (2008).

(2-125) **M. Hayashi**, D. Markham, M. Murao, M. Owari, and S. Virmani, "Entanglement of multiparty stabilizer, symmetric, and antisymmetric states," *Physical Review A*, Vol. 77, 012104 (2008).

(2-126) **M. Hayashi**, A. Kawachi, and H. Kobayashi, "Quantum measurements for hidden subgroup problems with optimal sample complexity," *Quantum Information and Computation*, Vol. 8, 0345–0358 (2008).

(2-127) **M. Hayashi** and K. Matsumoto, "Asymptotic performance of optimal state estimation in qubit system," *Journal of Mathematical Physics*, Vol. 49, 102101 (2008).

(2-128) F. Buscemi, **M. Hayashi**, and M. Horodecki, "Information extraction versus irreversibility in quantum measurement processes," *International Journal of Quantum Information (IJQI)*, Vol. 6, Supplementary Issue 1, 613–619 (2008).

(2-129) H. Nagaoka, and **M. Hayashi**, "An Information-Spectrum Approach to Classical and Quantum Hypothesis Testing for Simple Hypotheses," *IEEE Transactions on Information Theory*, Vol.53, 534-549 (2007).

(2-130) K. Matsumoto, and **M. Hayashi**, "Universal distortion-free entanglement concentration," *Physical Review A*, Vol.75, 062338 (2007).

(2-131) **M. Hayashi**, "Upper bounds of eavesdropper's performances in finite-length code with the decoy method," *Physical Review A*, Vol.76, 012329 (2007); *Physical Review A*, Vol.79, 019901(E) (2009).

(2-132) X.-B. Wang, T. Hiroshima, A. Tomita, and **M. Hayashi**, "Quantum information with Gaussian states," *Physics Reports*, Vol.448, 1-111 (2007).

(2-133) **M. Hayashi**, "General theory for decoy-state quantum key distribution with an arbitrary number of intensities," *New Journal of Physics*, Vol.9, 284 (2007).

(2-134) **M. Hayashi**, "Prior entanglement between senders enables perfect quantum network coding with modification," *Physical Review A*, Vol.76, 040301(R) (2007).

(2-135) **M. Hayashi**, "Error exponent in asymmetric quantum hypothesis testing and its application to classical-quantum channel coding," *Physical Review A*, Vol.76, 062301 (2007).

(2-136) **M. Hayashi**, D. Markham, M. Murao, M. Owari, and S. Virmani, "Bounds on Multipartite Entangled Orthogonal State Discrimination Using Local Operations and Classical Communication," *Physical Review Letters*, Vol.96, 040501, (2006).

(2-137) **M. Hayashi**, "General non-asymptotic and asymptotic formulas in channel resolvability and identification capacity and its application to wire-tap channel," *IEEE Transactions on Information Theory*, Vol. 52, No. 4, 1562-1575 (2006).

(2-138) **M. Hayashi**, "Parallel Treatment of Estimation of SU(2) and Phase Estimation," *Physics Letters A*, Vol.354, No.3, 183-189 (2006).

(2-139) **M. Hayashi**, "General formulas for fixed-length quantum entanglement concentration," *IEEE Transactions on Information Theory*, Vol. 52, No. 5, 1904-1921 (2006).

(2-140) **M. Hayashi**, "Optimal Visible Compression Rate For Mixed States Is Determined By Entanglement Purification," *Physical Review A, Rapid Communication*, Vol.73, 060301(R) (2006).

(2-141) **M. Hayashi**, "Characterization of several kinds of quantum analogues of relative entropy," *Quantum Information and Computation*, Vol.6, 583-596 (2006).

(2-142) **M. Hayashi**, "Practical Evaluation of Security for Quantum Key Distribution," *Physical Review A*, Vol.74, 022307 (2006).

(2-143) **M. Hayashi**, K. Iwama, H. Nishimura, R. Raymond, and S. Yamashita, "(4,1)-Quantum random access coding does not exist-one qubit is not enough to recover one of four bits," *New Journal of Physics*, Vol.8, 129 (2006).

(2-144) M. Owari, and **M. Hayashi**, "Local copying and local discrimination as a study for non-locality of a set," *Physical Review A*, Vol.74, 032108 (2006); *Physical Review A*, Vol.77, 039901(E) (2008).

(2-145) **M. Hayashi**, K. Matsumoto, and Y. Tsuda, "A study of LOCC-detection of a maximally entangled state using hypothesis testing," *Journal of Physics A: Mathematical and General*, Vol.39 14427-14446 (2006).

(2-146) **M. Hayashi**, B.-S. Shi, A. Tomita, K. Matsumoto, Y. Tsuda, and Y.-K. Jiang, "Hypothesis testing for an entangled state produced by spontaneous parametric down conversion," *Physical Review A*, Vol.74, 062321 (2006).

(2-147) **M. Hayashi**, H. Imai, K. Matsumoto, M. B. Ruskai and T. Shimono, "Qubit channels which require four inputs to achieve capacity: Implications for additivity conjectures," *Quantum Information and Computation*, Vol.5, 032-040 (2005).

(2-148) T. Ogawa and **M. Hayashi**, "On error exponents in quantum hypothesis testing," *IEEE Transactions on Information Theory*, Vol.50, No.6, pp.1368-1372 (2004).

(2-149) T. Hiroshima and **M. Hayashi**, "Finding a maximally correlated state – Simultaneous Schmidt decomposition of bipartite pure states," *Physical Review A*, Vol.70, (R)030302 (2004).

(2-150) **M. Hayashi** and H. Nagaoka, "General formulas for capacity of classical-quantum channels," *IEEE Transactions on Information Theory*, Vol.49, No.7, pp.1753-1768 (2003).

(2-151) **M. Hayashi**, M. Koashi, K. Matsumoto, F. Morikoshi, and A. Winter, "Error exponents for entanglement concentration," *Journal of Physics A: Mathematical and General*, Vol.36, No.2, pp.527-553 (2003).

(2-152) **M. Hayashi**, "Two quantum analogues of Fisher information from a large deviation viewpoint of quantum estimation," *Journal of Physics A: Mathematical and General*, Vol.35, No.36, pp.7689-7727 (2002).

(2-153) **M. Hayashi**, "Optimal sequence of quantum measurements in the sense of Stein's lemma in quantum hypothesis testing" *Journal of Physics A: Mathematical and General*, Vol.35, No.50, pp.10759-10773 (2002).

(2-154) **M. Hayashi** and K. Matsumoto, "Quantum universal variable-length source coding," *Physical Review A*, Vol.66, 022311 (2002).

(2-155) **M. Hayashi**, "Exponents of quantum fixed-length pure state source coding," *Physical Review A*, Vol.66, 032321 (2002). *Physical Review A*, Vol.66, 069901(E) (2002).

(2-156) F. Sakaguchi and **M. Hayashi**, "Coherent states and anihilation-creation operators associated with the irreducible unitary representations of su(1,1)," *Journal of Mathematical Physics*, Vol.43 pp.2241-2248 (2002).

(2-157) **M. Hayashi** and K. Matsumoto, "Simple construction of quantum universal variable-length coding," *Quantum Information and Computation*, Vol.2, Special Issue, pp.519-529 (2002).

(2-158) **M. Hayashi**, "Asymptotics of quantum relative entropy from a representation theoretical viewpoint," *Journal of Physics A: Mathematical and General*, Vol.34, No.16, pp.3413-3419 (2001).

(2-159) **M. Hayashi** and F. Sakaguchi, "Subnormal operators regarded as generalized observables and compound-system-type normal extension related to su(1,1)," *Journal of Physics A: Mathematical and General*, Vol.33, No.43, pp.7793-7820 (2000).

(2-160) **M. Hayashi**, "Asymptotic estimation theory for a finite dimensional pure state model," *Journal of Physics A: Mathematical and General*, Vol.31, No.20, pp.4633-4655 (1998); CORRIGENDUM *Journal of Physics A: Mathematical and General*, Vol. 31, p 8405 (1998).

3 Invited introductory articles

(3-1) **M. Hayashi**, "Role of Quantum Information Theory in Information Theory: Beyond the non-commutative expansion," *Fundamentals Review*, vol 10, No. 1, 4–13 (2016). In Japanese.

(3-2) **M. Hayashi**, "Second order analysis based on information spectrum," *IEEE Information Theory Society Newsletter*, Vol. 62, No. 1, 7–16 (2012).

(3-3) **M. Hayashi**, "Explanation of second-order asymptotic theory via information spectrum method," *Fundamentals Review*, vol 6, No. 1, 12–25 (2012). In Japanese.

(3-4) **M. Hayashi**, "Quantum information theory and its difficulty—For broad understanding—," *Fundamentals Review*, vol 3, No. 1, 44–56 (2009). In Japanese.

(3-5) **M. Hayashi**, "Quantum estimation and the quantum central limit theorem," in *Selected Papers on Probability and Statistics (American Mathematical Society Translations Series 2)* Vol. 277, 95–123 (2009).

(3-6) **M. Hayashi** and G. Kimura, "Report on Tohoku University Science Cafe – participatory public simulation of QKD with polarization plates–," Sugaku Tushin (a Japanese magazine published by The Mathematical Society of Japan) Vol. 14, No. 2, 38–46 (2009).

4 Book edition

(4-1) C. Bennett, J. Gruska, **M. Hayashi**, K. Matsumoto and A. Sakurai, eds. The Special Issue of EQIS Conference 2003, *International Journal of Quantum Information* Vol. 1, No. 4 (2003) & Vol. 2, No. 1 (2004).

(4-2) **M. Hayashi** (the chief editor), J. Inoue, Y. Kabashima and K. Tanaka. eds. *Proceedings of International Workshop on Statistical-Mechanical Informatics 2008 (IW-SMI 2008)*, *Journal of Physics: Conference Series Vol. 143*

(4-3) **M. Hayashi** eds. *Asymptotic Theory in Quantum Statistical Inference: Selected Papers* (World Scientific, 2005). These Selected Papers contain important results in Quantum Statistical Inference.

(4-4) H. Imai and **M. Hayashi** eds. *Quantum Computation and Information*, Springer (2006, May). This book contains the research activities of the ERATO Quantum Computation and Information Project Japan Science and Technology Agency (JST), which was at the time the largest project of quantum information and computation in Japan.

5 Conference Proceedings

(5-1) **M. Hayashi** and N. Cai, "Universal classical-quantum multiple access channel coding," *Proc. 2021 IEEE Int. Symp. Information Theory (ISIT)*, Melbourne, Victoria, Australia, 12–20 July 2021. (In Press)

(5-2) **M. Hayashi**, "Secure Modulo Sum via Multiple Access Channel," *Proc. 2021 IEEE Int. Symp. Information Theory (ISIT)*, Melbourne, Victoria, Australia, 12–20 July 2021. (In Press)

(5-3) S. Song and **M. Hayashi**, "Quantum Private Information Retrieval for Quantum Messages," *Proc. 2021 IEEE Int. Symp. Information Theory (ISIT)*, Melbourne, Victoria, Australia, 12–20 July 2021. (In Press)

(5-4) S. Song and **M. Hayashi**, "Equivalence of Non-Perfect Secret Sharing and Symmetric Private Information Retrieval with General Access Structure," *Proc. 2021 IEEE Int. Symp. Information Theory (ISIT)*, Melbourne, Victoria, Australia, 12–20 July 2021. (In Press)

(5-5) **M. Hayashi**, K. Fang, and K. Wang, "Finite Block Length Analysis on Quantum Coherence Distillation and Incoherent Randomness," *Proc. 2021 IEEE Int. Symp. Information Theory (ISIT)*, Melbourne, Victoria, Australia, 12–20 July 2021. (In Press)

(5-6) F. Salek, **M. Hayashi**, and A. Winter, "Asymptotic Separation Between Adaptive and Non-adaptive Strategies in Quantum Channel Discrimination," *Proc. 2021 IEEE Int. Symp. Information Theory (ISIT)*, Melbourne, Victoria, Australia, 12–20 July 2021. (In Press)

(5-7) Y. Yoshida and **M. Hayashi**, "Classical Mechanism is Optimal in Classical-Quantum Differentially Private Mechanisms" *Proc. IEEE International Symposium on Information Theory (ISIT2020)*, Los Angeles, California, USA, June 21 – 26 (2020), pp. 1973–1977

(5-8) S. Song and **M. Hayashi**, "Capacity of Quantum Private Information Retrieval with Colluding Servers" *Proc. IEEE International Symposium on Information Theory (ISIT2020)*, Los Angeles, California, USA, June 21 – 26 (2020), pp. 1077–1082

(5-9) K. Wang and **M. Hayashi**, "Permutation Enhances Classical Communication Assisted by Entangled States" *Proc. IEEE International Symposium on Information Theory (ISIT2020)*, Los Angeles, California, USA, June 21 – 26 (2020), pp. 1840–1845

(5-10) S. Song and **M. Hayashi**, "Capacity of Quantum Private Information Retrieval with Collusion of All But One of Servers" *Proc. IEEE Information Theory Workshop (ITW2019)*, Visby, Gotland, Sweden, August 25 – 28, 2019. (Proceedings of this conference assigned no page number, but assigned DOI: 10.1109/ITW44776.2019.89892

(5-11) **M. Hayashi** and Y. Chen, "Secrecy and Error Exponents of k-Transmitter Multiple Access Wire-tap Channel" *Proc. IEEE Information Theory Workshop (ITW2019)*, Visby, Gotland, Sweden, August 25 – 28, 2019. (Proceedings of this conference assigned no page number, but assigned DOI: 10.1109/ITW44776.2019.8989099).

(5-12) S. Takabe, T. Wadayama, and **M. Hayashi**, "Asymptotic Analysis on LDPC-BICM Scheme for Compute-and-Forward Relaying" *Proc. IEEE International Symposium on Information Theory (ISIT2019)*, Paris, France, July 7 – 12, 2019, pp. 2923 – 2927.

(5-13) S. Song, **M. Hayashi**, "Capacity of Quantum Private Information Retrieval with Multiple Servers" *Proc. IEEE International Symposium on Information Theory (ISIT2019)*, Paris, France, July 7 – 12, 2019, pp. 2149 – 2153.

(5-14) **M. Hayashi**, "Secure list decoding" *Proc. IEEE International Symposium on Information Theory (ISIT2019)*, Paris, France, July 7 – 12, 2019, pp. 1727 – 1731.

(5-15) Y. Yoshida, M.-H. Yung, and **M. Hayashi**, "Optimal Mechanism for Randomized Responses under Universally Composable Security Measure" *Proc. IEEE International Symposium on Information Theory (ISIT2019)*, Paris, France, July 7 – 12, 2019, pp. 547 – 551.

(5-16) **M. Hayashi**, "Semi-Finite Length Analysis for Secure Random Number Generation" *Proc. IEEE International Symposium on Information Theory (ISIT2019)*, Paris, France, July 7 – 12, 2019, pp. 952 – 956.

(5-17) A. Vazquez-Castro and **M. Hayashi**, "One-way and Two-way Physical Layer Security Protocols for the Gaussian Satellite Channel," *Proc. 2019 IEEE International Conference on Communications (ICC): SAC Satellite and Space Communications Track - Satellite and Space Communications*, Shanghai, China, May 20–24, 2019. DOI: 10.1109/ICC.2019.8761490.

(5-18) **M. Hayashi**, "Secure physical layer network coding versus secure network coding," *Proc. IEEE Inf. Theory Workshop 2018 (ITW 2018)*, Guangzhou, China, November 25–29, 2018, pp. 430 – 434.

(5-19) S. Song and **M. Hayashi**, "Secure Quantum Network Code without Classical Communication," *Proc. IEEE Inf. Theory Workshop 2018 (ITW 2018)*, Guangzhou, China, November 25–29, 2018, pp. 126 – 130.

(5-20) **M. Hayashi**, T. Wadayama, and A. Vazquez-Castro, "Secure Computation-and-Forward with Linear Codes," *Proc. IEEE Inf. Theory Workshop 2018 (ITW 2018)*, Guangzhou, China, November 25–29, 2018, pp. 620 – 624.

(5-21) S. Song and **M. Hayashi**, "Quantum Network Code for Multiple-Unicast Network with Quantum Invertible Linear Operations," In: S. Jeffery (eds) *13th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2018). Leibniz International Proceedings in Informatics (LIPIcs)*, vol 111.

pp. 10:1–10:20. Centre for Quantum Software and Information (QSI), University of Technology Sydney, July 16 – 18, 2018.

(5-22) Y. Yang, G. Chiribella, and **M. Hayashi**, "Compression for qubit clocks," *IEEE International Symposium on Information Theory (ISIT2018)*, Talisa Hotel in Vail, Colorado, USA, June, 17 – 22, 2018. pp. 2476 – 2480.

(5-23) **M. Hayashi** and T. Koshiba, "Universal Construction of Cheater-Identifiable Secret Sharing Against Rushing Cheaters Based on Message Authentication," *IEEE International Symposium on Information Theory (ISIT2018)*, Talisa Hotel in Vail, Colorado, USA, June, 17 – 22, 2018. pp. 2614 – 2618.

(5-24) A. Anshu, **M. Hayashi** and N. Warsi, "Secure communication over fully quantum Gel'fand-Pinsker wiretap channel," *IEEE International Symposium on Information Theory (ISIT2018)*, Talisa Hotel in Vail, Colorado, USA, June, 17 – 22, 2018. pp. 2679 – 2683.

(5-25) Y. Yoshida and **M. Hayashi**, "Asymptotically Decoupling and Mixing Properties in Quantum System," *IEEE International Symposium on Information Theory (ISIT2018)*, Talisa Hotel in Vail, Colorado, USA, June, 17 – 22, 2018. pp. 261 – 265.

(5-26) S. Takabe, Y. Ishimatsu, T. Wadayama, and **M. Hayashi**, "Asymptotic Analysis on Spatial Coupling Coding for Two-Way Relay Channels," *IEEE International Symposium on Information Theory (ISIT2018)*, Talisa Hotel in Vail, Colorado, USA, June, 17 – 22, 2018. pp. 1021 – 1025.

(5-27) G. Kato, M. Owari, and **M. Hayashi**, "Single-Shot Secure Quantum Network Coding for General Multiple Unicast Network with Free Public Communication," In: Shikata J. (eds) *10th International Conference on Information Theoretic Security (ICITS2017). Lecture Notes in Computer Science*, vol 10681. Springer, pp. 166 – 187.

(5-28) **M. Hayashi** and V. Tan, "Minimum Rates of Approximate Sufficient Statistics," *IEEE International Symposium on Information Theory (ISIT2017)*, Aachen, Germany, June, 25 – 30, 2017, pp. 3045 – 3049.

(5-29) **M. Hayashi**, M. Owari, G. Kato, and N. Cai, "Secrecy and Robustness for Active Attack in Secure Network Coding," *IEEE International Symposium on Information Theory (ISIT2017)*, Aachen, Germany, June, 25 – 30, 2017, pp. 1172 – 1177.

(5-30) **M. Hayashi**, "Secure wireless communication under spatial and local Gaussian noise assumptions," *IEEE International Symposium on Information Theory (ISIT2017)*, Aachen, Germany, June, 25 – 30, 2017, pp. 1698 – 1703.

(5-31) R. Yaguchi and **M. Hayashi**, "Second Order Analysis for Joint Source-Channel Coding with Markovian Source," *IEEE International Symposium on Information Theory (ISIT2017)*, Aachen, Germany, June, 25 – 30, 2017, pp. 918 – 923.

(5-32) Y. Yang, G. Bai, G. Chiribella, and **M. Hayashi**, "Compression for quantum population coding," *IEEE International Symposium on Information Theory (ISIT2017)*, Aachen, Germany, June, 25 – 30, 2017, pp. 1973 – 1978.

(5-33) A. Vazquez Castro and **M. Hayashi**, "Information-theoretic physical layer security for satellite channels," *2017 IEEE Aerospace Conference*, Montana, USA, 4 - 11, March, 2017. DOI: 10.1109/AERO.2017.7943976

(5-34) **M. Hayashi**, V. Y. F. Tan, "Remaining uncertainties and exponents under Renyi information measures," *IEEE International Symposium on Information Theory (ISIT2016)*, Barcelona, July 10-15, 2016, pp. 1536 – 1540.

(5-35) M. Tomamichel, **M. Hayashi**, "Operational interpretation of Renyi conditional mutual information via composite hypothesis testing against Markov distributions," *IEEE International Symposium on Information Theory (ISIT2016)*, Barcelona, July 10-15, 2016, pp. 585 – 589.

(5-36) **M. Hayashi** and V. Tan, "Erasure and Undetected Error Probabilities in the Moderate Deviations Regime," *IEEE International Symposium on Information Theory (ISIT2015)*, Hong Kong, June, 14-19, 2015, pp. 1821 – 1825.

(5-37) **M. Hayashi** and V Tan, "Equivocations and Exponents under Various Renyi Information Measures," *IEEE International Symposium on Information Theory (ISIT2015)*, Hong Kong, June, 14-19, 2015, pp. 281 – 285.

(5-38) **M. Hayashi** and T. Tsurumaru, "More Efficient Privacy Amplification with Less Random Seeds," *IEEE International Symposium on Information Theory (ISIT2015)*, Hong Kong, June, 14-19, 2015, pp. 1786 – 1790.

(5-39) **M. Hayashi** and M. Tomamichel, "Correlation Detection and an Operational Interpretation of the Renyi Mutual Information," *IEEE International Symposium on Information Theory (ISIT2015)*, Hong Kong, June 14-19, 2015, pp. 1477 – 1481 (Semi plenary).

(5-40) **M. Hayashi** and M Owari, "Tight asymptotic bounds on local hypothesis testing between a pure bipartite state and the white noise state," *IEEE International Symposium on Information Theory (ISIT2015)*, Hong Kong, June 14-19, 2015, pp. 691 – 695.

(5-41) **M. Hayashi**, "Universal Channel Coding with Continuous Output System," *2014 International Symposium on Information Theory and Its Applications (ISITA2014)*, Melbourne, Australia, October 26 - 29, 2014, pp. 21 – 25.

(5-42) S. Watanabe and **M. Hayashi**, "Finite-length Analysis on Tail Probability and Simple Hypothesis Testing for Markov Chain," *2014 International Symposium on Information Theory and Its Applications (ISITA2014)*, Melbourne, Australia, October 26 - 29, 2014, pp.196 – 200.

(5-43) M. Hayashi, H. Tyagi, and S. Watanabe, "Strong Converse for a Degraded Wiretap Channel via Active Hypothesis Testing," 52nd Annual Allerton Conference on Communication, Control, and Computing, Monticello, Illinois, USA, 30 September - 3 October, 2014. pp.148 – 151.

(5-44) K. Ito, W. Kumagai, and **M. Hayashi**, "Asymptotic Reversibility of LOCC Conversions," *IEEE International Symposium on Information Theory (ISIT2014)*, Honolulu, HI, USA, June 29 - July 4, 2014. pp.531

(5-45) M. Tomamichel, M. Berta, and **M. Hayashi**, "A Duality Relation Connecting Different Quantum Generalizations of the Conditional Renyi Entropy," *IEEE International Symposium on Information Theory (ISIT2014)*, Honolulu, HI, USA, June 29 - July 4, 2014. pp.731

(5-46) **M. Hayashi**, and S. Watanabe, "Information Geometry Approach to Parameter Estimation in Markov Chains," *IEEE International Symposium on Information Theory (ISIT2014)*, Honolulu, HI, USA, June 29 - July 4, 2014. pp.1091

(5-47) **M. Hayashi**, H. Tyagi, and S. Watanabe "Secret key agreement: general capacity and second-order asymptotics," *IEEE International Symposium on Information Theory (ISIT2014)*, Honolulu, HI, USA, June 29 - July 4, 2014. pp.1136

(5-48) V. Y. F. Tan, S. Watanabe, and **M. Hayashi**, "Moderate Deviations for Joint Source-Channel Coding of Systems With Markovian Memory," *IEEE International Symposium on Information Theory (ISIT2014)*, Honolulu, HI, USA, June 29 - July 4, 2014. pp.1687

(5-49) W. Kumagai, and **M. Hayashi**, "Strong Converse and Second-Order Asymptotics of Channel Resolvability," *IEEE International Symposium on Information Theory (ISIT2014)*, Honolulu, HI, USA, June 29 - July 4, 2014. pp.1882

(5-50) **M. Hayashi** and S. Watanabe, "Random Number Conversion via Restricted Storage," *IEEE International Symposium on Information Theory (ISIT2014)*, Honolulu, HI, USA, June 29 - July 4, 2014. pp.2047

(5-51) **M. Hayashi** and S. Watanabe "Non-Asymptotic Bounds on Fixed Length Source Coding for Markov Chains," *51st Annual Allerton Conference on Communication, Control, and Computing*, Allerton House, Monticello, Illinois, USA, 2–4, October, 2013.

(5-52) S. Watanabe and **M. Hayashi** "Non-Asymptotic Analysis of Privacy Amplification via Renyi Entropy and Inf-Spectral Entropy," *2013 IEEE International Symposium on Information Theory (ISIT 2013)*, Istanbul, Turkey, 7–12, July, 2013, pp. 2715-2719.

(5-53) W. Kumagai and **M. Hayashi** "Second Order Asymptotics for Random Number Generation," *2013 IEEE International Symposium on Information Theory (ISIT 2013)*, Istanbul, Turkey, 7–12, July, 2013, pp. 1506-1510.

(5-54) **M. Hayashi** and R. Matsumoto, "Secure multiplex coding with dependent and non-uniform multiple messages," in *Proceedings of Fiftieth Annual Allerton Conference on Communication, Control, and Computing*,

Allerton House, Monticello, Illinois, USA, 1–5, October, 2012, pp. 954–959.

(5-55) **M. Hayashi**, "Fourier analytic approach to estimation of group action," *The XXIX International Colloquium on Group-Theoretical Methods in Physics*, Chern Institute of Mathematics, Tianjin, China, 20–26, August, 2012. The proceedings was published as C. Bai, J.-P. Gazeau, and M.-L. Ge eds., *Symmetries and Groups in Contemporary Physics*, Vol. 11, Nankai Series in Pure, Applied Mathematics and Theoretical Physics, World Scientific Company, 2013, pp. 257 – 262.

(5-56) **M. Hayashi**, "Precise evaluation of leaked information with universal2 privacy amplification in the presence of quantum attacker," *Proceedings of 2012 IEEE International Symposium on Information Theory (ISIT 2012)*, Cambridge, MA, USA, 1–6, July, 2012, pp. 890–894.

(5-57) **M. Hayashi**, "Quantum wiretap channel with non-uniform random number and its exponent of leaked information," *Proceedings of 2012 IEEE International Symposium on Information Theory (ISIT 2012)*, Cambridge, MA, USA, July, 1–6, 2012, pp. 895–899.

(5-58) **M. Hayashi**, "Quantum security analysis via smoothing of Renyi entropy of order 2," *The 7th Conference on Theory of Quantum Computation, Communication, and Cryptography (TQC2012)*, Koshiba Hall, The University of Tokyo, Tokyo, Japan, 17–19, May, 2012; Lecture Notes in Computer Science series, vol. 7582, pp. 128–140.

(5-59) **M. Hayashi** and R. Matsumoto, "Universally attainable error and information exponents, and equivocation rate for the broadcast channels with confidential messages," *Proceedings of Forty-Ninth Annual Allerton Conference*, University of Illinois at Urbana-Champaign, IL, USA, 28–30, September, 2011, pp. 439–444.

(5-60) R. Matsumoto and **M. Hayashi**, "Secure multiplex network coding," *Proceedings of 2011 International Symposium on Network Coding (NetCod)*, Beijing, China, 25–27, July, 2011. (Proceedings of this conference assigned no page number, but assigned DOI: 10.1109/ISNETCOD.2011.5979076).

(5-61) R. Matsumoto and **M. Hayashi**, "Secure multiplex coding with a common message," *Proceedings of 2011 IEEE International Symposium on Information Theory (ISIT 2011)*, Saint-Petersburg, Russia, 31, July–5, August, 2011, pp.1965–1969.

(5-62) **M. Hayashi**, R. Matsumoto, "Construction of wiretap codes from ordinary channel codes," *Proceedings of 2010 IEEE International Symposium on Information Theory (ISIT 2010)*, Austin, USA, 13–18, June, 2010, pp. 2538–2542.

(5-63) **M. Hayashi**, "Quantum channel estimation and asymptotic bound," *Journal of Physics: Conference Series*, Vol. 233, 012016 (2010), *International Workshop on Statistical-Mechanical Informatics 2010 (IW-SMI 2010)*, Kyoto, Japan, March, 7–10, 2010.

(5-64) **M. Hayashi**, "Quantum universal coding protocols and universal approximation of multi-copy states," *Journal of Physics: Conference Series*, Vol. 143, 012017 (2009), *International Workshop on Statistical-Mechanical Informatics 2008 (IW-SMI 2008)*, Sendai International Center, Sendai, Japan, 14–17, September 2008.

(5-65) D. Markham, A Miyake, S. Virmani, M. Owari, M. Murao, and **M. Hayashi**, "Entanglement and local access of information graphs states," *Proceedings of 8th International Conference on Quantum Communication, Measurement, and Computing (QCMC06)*, Tsukuba, Japan, November 28 – December 3, (2006), p. 97.

(5-66) **M. Hayashi**, "Gallager Bound of Classical-Quantum Channel Coding," *Proceedings of 8th International Conference on Quantum Communication, Measurement, and Computing (QCMC06)*, Tsukuba, Japan, November 28 – December 3, (2006), p. 89.

(5-67) **M. Hayashi**, K. Iwama, H. Nishimura, R. Raymond, and S. Yamashita, "(4,1)-Quantum Random Access Coding Does Not Exist," *Proceedings of 2006 IEEE International Symposium on Information Theory (ISIT 2006)*, Seattle, Washington, July 9 – 14, (2006), p. 446-450.

(5-68) **M. Hayashi**, K. Iwama, H. Nishimura, R. Raymond, and S. Yamashita, "Quantum Network Coding," *24th International Symposium on Theoretical Aspects of Computer Science (STACS 2007)*, Aachen, Germany; 22-24 February 2007: W. Thomas and P. Weil (Eds.), Lecture Notes in Computer Science, vol 4393, Springer Berlin,pp. 610-621, (2007).

(5-69) K. Matsumoto and **M. Hayashi**, "Universal distortion-free entanglement concentration," *Proceedings of 2004 IEEE International Symposium on Information Theory (ISIT 2004)*, Chicago, USA, June 27–July 2, (2004), p.323.

(5-70) **M. Hayashi**, "General non-asymptotic and asymptotic formulas in channel resolvability and identification capacity," *Proceedings of International Symposium on Information Theory and its Applications (ISITA 2004)*, Parma, Italy, October 10 – 13, (2004), p. 1562–1567.

(5-71) **M. Hayashi**, "Exponents of channel resolvability and wire-tapped channel," *Proceedings of International Symposium on Information Theory and its Applications (ISITA 2004)*, Parma, Italy, October 10 – 13, (2004), p. 1080–1085.

(5-72) **M. Hayashi**, "Estimation of SU(2) action by using entanglement," Proceedings of The 7th International Conference on Quantum Communication, Measurement and Computing, Glasgow, UK, July 25–29 (2004), p.269–272 (Ameriacan Institute of Physics, 2004).

(5-73) **M. Hayashi** and K. Matsumoto, "Simple construction of quantum universal variable-length source coding," *Proceedings of 2003 IEEE International Symposium on Information Theory (ISIT 2003)*, Yokohama, June 29 – July 4, (2003), p.459.

(5-74) **M. Hayashi**, "General asymptotic formulas for fixed-length quantum entanglement concentration," *Proceedings of 2003 IEEE International Symposium on Information Theory (ISIT 2003)*, Yokohama, June 29 – July 4, (2003), p.431.

(5-75) T. Ogawa and **M. Hayashi**, "On error exponents in quantum hypothesis testing," *Proceedings of 2003 IEEE International Symposium on Information Theory (ISIT 2003)*, Yokohama, June 29 – July 4, (2003), p.479.

(5-76) **M. Hayashi** and H. Nagaoka, "A general formula for the classical capacity of a general quantum channel," *Proceedings of 2002 IEEE International Symposium on Information Theory (ISIT 2002)*, Lausanne, Switzerland, June 30–July 5, (2002), p.71.

(5-77) F. Sakaguchi and **M. Hayashi**, "A relationship between continuous wavelet transformation and the algebra su(1,1)," *Proceedings of the IASTED International Conference on Signal Processing and Communications*, Marbella, Spain, September 19–22, (2000), pp.390-394.

(5-78) **M. Hayashi**, "Asymptotic quantum estimation theory for the thermal states family," *Fourth International Conference on Quantum Communication, Measurement, and Computing*, Northwestern University, Evanston, Illinois, August 22–27, (1998); in *Quantum Communication, Computing, and Measurement2*, Plenum Publishing, pp.390–394 (2000).

(5-79) **M. Hayashi**, "A linear programming approach to attainable Cramer-Rao type bound," *Third International Conference on Quantum Communication & Measurement*, Mt. Fuji-Hakone Land, Japan, September 25-30, (1996); in *Quantum Communication, Computing, and Measurement*, Plenum Publishing, (1997), pp.99–108.

6 Refereed oral presentation without proceeding

(6-1) S. Song and **M. Hayashi**, "Capacity of Quantum Private Information Retrieval with Colluding Servers," *20th Asian Quantum Information Science Conference*, Sydney, Australia, 7 – 9 December 2020. (online event)

(6-2) G. Bai, Y.-D. Wu, Y. Zhu, **M. Hayashi**, and G. Chiribella, "Efficient Algorithms for Causal Order Discovery in Quantum Networks," *20th Asian Quantum Information Science Conference*, Sydney, Australia, 7 – 9 December 2020. (online event)

(6-3) **M. Hayashi** and N. Cai, "Universal classical-quantum superposition coding and universal classical-quantum multiple access channel coding," *20th Asian Quantum Information Science Conference*, Sydney, Australia, 7 – 9 December 2020. (online event)

(6-4) K. Wang and **M. Hayashi**, "Permutation Enhances Classical Communication Assisted by Entangled States," *20th Asian Quantum Information Science Conference*, Sydney, Australia, 7 – 9 December 2020. (online event)

(6-5) **M. Hayashi**, K. Wang, and K. Fang, "Finite Block Length Analysis on Quantum Coherence Distillation and Incoherent Randomness Extraction," *20th Asian Quantum Information Science Conference*, Sydney, Australia, 7 – 9 December 2020. (online event)

(6-6) Y. Yoshida, H. Arai, and **M. Hayashi**, "Perfect Discrimination in Approximate Quantum Theory of General Probabilistic Theories," *20th Asian Quantum Information Science Conference*, Sydney, Australia, 7 – 9 December 2020. (online event)

(6-7) F. Salek, **M. Hayashi**, and A. Winter, "When are Adaptive Strategies in Asymptotic Quantum Channel Discrimination Useful?," *Beyond IID in Information Theory 8*, Stanford University, USA, November 9 - 13, 2020 (online event on Zoom).

(6-8) **M. Hayashi**, K. Wang, and K. Fang, "Finite Block Length Analysis on Quantum Coherence Distillation and Incoherent Randomness Extraction," *Beyond IID in Information Theory 8*, Stanford University, USA, November 9 - 13, 2020 (online event on Zoom).

(6-9) R. Takagi, K. Wang, and **M. Hayashi** "Application of the Resource Theory of Channels to Communication Scenarios," *Beyond IID in Information Theory 8*, Stanford University, USA, November 9 - 13, 2020 (online event on Zoom).

(6-10) H. Zhu and **M. Hayashi**, "Efficient Verification of Pure Quantum States in the Adversarial Scenario" *Quantum Information Processing 2020 (QIP)*, Shenzhen, China, January 6 – 10, 2020.

(6-11) S. Song and **M. Hayashi**, "Capacity of Quantum Private Information Retrieval with Multiple Servers" *19th Asian Quantum Information Science Conference*, Seoul, Korea, August 19 – 23, 2019.

(6-12) **M. Hayashi**, "Verification of Graph state, Hypergraph state, and Weighted graph state" *Beyond iid Conference*, University of Technology Sydney, Sydney, Australia, July 1–5, 2019.

(6-13) Z. Fan, Z. Yao, **M. Hayashi**, and W. Eddy, "Quantifying time-varying sources in magnetoencephalography: A discrete approach," *The 3rd International Conference on Econometrics and Statistics (EcoSta 2019)*, the National Chung Hsing University (NCHU), Taichung, Taiwan, June 25 – 27 ,2019.

(6-14) H. Zhu and **M. Hayashi**, "Universally Fisher-symmetric informationally complete measurements," *18th Asian Quantum Information Science Conference*, Nagoya, Japan, September 8 – 12, 2018.

(6-15) Y. Yang, G. Chiribella and **M. Hayashi**, "Attaining the ultimate precision limit in quantum state estimation," *18th Asian Quantum Information Science Conference*, Nagoya, Japan, September 8 – 12, 2018. (It was selected as a Plenary Contributed Talk.)

(6-16) Y. Yang, G. Bai, G. Chiribella, and **M. Hayashi**, "Compression for identically prepared qudit states," *Quantum Information Processsing (QIP 2018)*. QuTech at Delft University of Technology, Delft, The Netherlands, January 15 - 19, 2018.

(6-17) **M. Hayashi**, "Secure wireless communication under spatial and local Gaussian noise assumptions," *10th International Conference on Information Theoretic Security (ICITS2017) Workshop Track*, Hong Kong, China, November 29 – December 2, 2017.

(6-18) **M. Hayashi**, M. Owari, G. Kato, and N. Cai, " Secrecy and Robustness for Active Attack in Secure Network Coding and its Application to Network Quantum Key Distribution," *10th International Conference on Information Theoretic Security (ICITS2017) Workshop Track*, Hong Kong, China, November 29 – December 2, 2017.

(6-19) A. Vazquez-Castro and **M. Hayashi**, "Information-theoretic Physical Layer Security for Satellite Channels," *10th International Conference on Information Theoretic Security (ICITS2017) Workshop Track*, Hong Kong, China, November 29 – December 2, 2017.

(6-20) K. Ito and **M. Hayashi**, "Optimal performance of generalized heat engines with finite-size baths of multiple conserved quantities beyond i.i.d. scaling," *14th Granada Seminar on Quantum Systems in and out of Equilibrium: Fundamentals, dynamics and applications,* Facultad de Ciencias, Universidad de Granada, Granada, Spain, 20-23 June, 2017.

(6-21) K. Fujii and **M. Hayashi**, "Verifiable fault-tolerance in measurement-based quantum computation," *Asian Conference on Quantum Information Science (AQIS 17)*, National University of Singapore, Singapore, September 4 - 8, 2017.

(6-22) Y. Yang, G. Bai, G. Chiribella, and **M. Hayashi**, "Compression for Quantum Population Coding," *Asian Conference on Quantum Information Science (AQIS 17)*, National University of Singapore, Singapore, September 4 - 8, 2017.

(6-23) Y. Yang, G. Chiribella, and **M. Hayashi**, "Optimal compression for identically prepared qubit states," *The 20th workshop on Quantum Information Processing (QIP 2017)*, Washington, Seattle, USA, 16-20, January, 2017.

(6-24) K. Ito, W. Kumagai, and **M. Hayashi**, "Asymptotic Entanglement Preservability of LOCC Conversions," *14th Asian Quantum Information Science Conference (AQIS2014),* Shirankaikan, Kyoto, Japan, August 20–24, 2014.

(6-25) **M. Hayashi** and S. Watanabe "Non-Asymptotic Analysis of Privacy Amplification for Markov Chains," *The 7th International Conference on Information Theoretic Security (ICITS 2013) Workshop Track*, Singapore, November, 28–30, 2013.

(6-26) W. Kumagai, **M. Hayashi**, "Quantum hypothesis testing for quantum Gaussian states," *Bernoulli Society Satellite Meeting to the ISI World Statistics Congress 2013*, The University of Tokyo, Tokyo, Japan, September 2–4, 2013.

(6-27) M. Tomamichel and **M. Hayashi**, "A hierarchy of information quantities for the finite block length analysis of quantum tasks," *The 15th workshop on Quantum Information Processing (QIP 2013)*, Beijing, China, 21–25, January, 2013. (Available online: http://arxiv.org/abs/1208.1478).

(6-28) W. Kumagai and **M. Hayashi**, "Irreversibility of entanglement concentration for pure state" *The 12th Asian Conference on Quantum Information Science (AQIS 2012)*, Suzhou, China, 23–26, August, 2012. (Available online: http://arxiv.org/abs/1205.4370).

(6-29) M. Owari and **M. Hayashi**, "Asymptotic local hypothesis testing between a pure bipartite state and the completely mixed state," *The 2nd Institute of Mathematical Statistics Asia Pacific Rim Meeting*, Epochal Tsukuba, Tsukuba, Japan, 2–4, July, 2012. (Available online: http://arxiv.org/abs/1105.3789).

(6-30) W. Kumagai and **M. Hayashi**, "Quantum hypothesis testing for quantum Gaussian states," *The 2nd Institute of Mathematical Statistics Asia Pacific Rim Meeting*, Epochal Tsukuba, Tsukuba, Japan, 2–4, July, 2012.

(6-31) L. Chen and **M. Hayashi**, "Classifying tripartite pure states in quantum information science and tensor rank," *The 2nd Institute of Mathematical Statistics Asia Pacific Rim Meeting*, Epochal Tsukuba, Tsukuba, Japan, 2–4, July, 2012.

(6-32) T. Tsurumaru and **M. Hayashi**, "Dual universality of hash functions and its applications to classical and quantum cryptography" *QCRYPT 2011: First Annual Conference on Quantum Cryptography*, Zürich, Switzerland 12–16, September, 2011.

(6-33) **M. Hayashi**, "Theoretical analysis and implementation on QKD with the decoy-state method," *Theory and Realisation of Practical Quantum Key Distribution*, University of Waterloo, June 11 – 14, 2007

(6-34) F. Buscemi, **M. Hayashi**, and M. Horodecki, "A general entropic approach to the information-disturbance tradeoff problem in quantum measurements," *Third Asia Pacific Conference on Quantum Information Science*, Nanyang Executive Center, Singapore, 30 July – 2 August, (2007).

(6-35) **M. Hayashi**, D. Markham, M. Murao, M. Owari, and S. Virmani, "Entanglement and group symmetries: stabilizer, symmetric and anti-symmetric states," *Asian Conference on Quantum Information Science (AQIS 07)*, Shiran Kaikan, Kyoto University, Japan, September 3 - 6, (2007), p. 24–25.

(6-36) **M. Hayashi**, "Prior entanglement between senders enables perfect quantum network coding," *Asian Conference on Quantum Information Science (AQIS 07)*, Shiran Kaikan, Kyoto University, Japan, September 3 – 6, (2007), p.38–39.

(6-37) F. Buscemi, **M. Hayashi**, and M. Horodecki, "A general entropic approach to the information-disturbance tradeoff problem in quantum measurements," *Asian Conference on Quantum Information Science (AQIS 07)*,

Shiran Kaikan, Kyoto University, Japan September 3 – 6, (2007), p.40–41

(6-38) **M. Hayashi**, "General theory for decoy-state QKD with arbitrary number of intensities," *Asian Conference on Quantum Information Science (AQIS 07)*, Shiran Kaikan, Kyoto University, Japan September 3 – 6, (2007), p.75–76

(6-39) J. Hasegawa, **M. Hayashi**, T. Hiroshima, and A. Tomita, "Security analysis and experiment of decoy state quantum key distribution incorporating finite statistics," *Asian Conference on Quantum Information Science (AQIS 07)*, Shiran Kaikan, Kyoto University, Japan September 3 – 6, (2007), p.77–78

(6-40) F. Buscemi, **M. Hayashi**, and M. Horodecki, "INFORMATION EXTRACTION VERSUS IRREVERSIBILITY IN QUANTUM MEASUREMENT PROCESSES," *Noise Information & Complexity Quantum Scale*, Ettore Majorana Centre, Erice (Sicily), Italy, 4th – 10th November (2007).

(6-41) **M. Hayashi**, K. Iwama, H. Nishimura, R. Raymond, and S. Yamashita, "Quantum Network Coding," *QIP 2006 - The 9th Workshop on Quantum Information Processing (QIP 06)*, Paris, January 16 – 20, (2006).

(6-42) **M. Hayashi**, "Practical Evaluation of Security for Quantum Key Distribution," *Asian conference on Quantum Information Science 2006 (AQIS 06)*, BeiJing Friendship Hotel, BeiJing, China, September 1–4, (2006), p. 9–10.

(6-43) M. Owari and **M. Hayashi**, "The relationship between local copying and local discrimination," *ERATO conference on Quantum Information Science 2005 (EQIS 05)*, JST, Tokyo, August 26–30, (2005), pp. 31–32.

(6-44) D. Markham, S. Virmani, M. Owari, M. Murao, **M. Hayashi**, "Local Discrimination and multipartite entanglement measures," *ERATO conference on Quantum Information Science 2005 (EQIS 05)*, JST, Tokyo, August 26–30, (2005), pp. 91–92.

(6-45) T. Tsuda, B.S. Shi, A. Tomita, **M. Hayashi**, K. Matsumoto, and Y.K. Jiang, "Hypothesis testing for an entangled state produced by spontaneous parametric down conversion," *ERATO conference on Quantum Information Science 2005 (EQIS 05)*, JST, Tokyo, August 26–30, (2005), pp. 57–58.

(6-46) T. Hiroshima and **M. Hayashi**, "Finding a maximally correlated state – Simultaneous Schmidt decomposition of bipartite pure states," *ERATO conference on Quantum Information Science 2004 (EQIS 04)*, Tokyo, September 1–5, (2004), pp. 43–44.

(6-47) **M. Hayashi**, H. Imai, K. Matsumoto, M. B. Ruskai and T. Shimono, "Qubit channels which require four inputs to achieve capacity: Implications for additivity conjectures," *ERATO conference on Quantum Information Science 2004 (EQIS 04)*, Tokyo, September 1–5, (2004), pp. 45–46.

(6-48) **M. Hayashi**, "Estimation of SU(2) action by using entanglement," *ERATO conference on Quantum Information Science 2004 (EQIS 04)*, Tokyo, September 1–5, (2004), pp. 68–69.

(6-49) Y. Tsuda, **M. Hayashi** and K. Matsumoto, "Hypothesis testing for entanglement," *ERATO conference on Quantum Information Science 2004 (EQIS 04)*, Tokyo, September 1–5, (2004), pp. 70–71.

(6-50) **M. Hayashi** and K. Matsumoto, "Quantum universal variable-length source coding," *ERATO Workshop on Quantum Information Science 2002 (EQIS 02)*, Tokyo, September 5-8, (2002), pp. 31–32.

(6-51) F. Morikoshi, **M. Hayashi**, M. Koashi, K. Matsumoto, and A. Winter, "Error exponents for entanglement concentration," *ERATO Workshop on Quantum Information Science 2002 (EQIS 02)*, Tokyo, September 5-8, (2002), pp.46-47.

(6-52) **M. Hayashi**, "Optimal sequence of POVMs in the sense of Stein's lemma in quantum hypothesis testing," *ERATO workshop on Quantum Information Science 2001 (EQIS 01)*, Tokyo, September 6-8, (2001), p.20.

7 Invited talks

(7-1) **M. Hayashi**, "Information-Theoretic Anonymous Cryptographic Protocols (Plenary Talk)," *ISITA2020 - The International Symposium on Information Theory and Its Applications*, Kapolei, Hawai'i, USA, October 24 – 27, 2020 (Online).

(7-2) **M. Hayashi**, "Quantum Information Processing over Quantum Network (Plenary Talk)," *SPCOM 2020 - International Conference on Signal Processing and Communications*, Indian Institute of Science, Bangalore, India, July 19-24, 2020 (Online).

(7-3) **M. Hayashi**, "Overview about previous finite size results," *QKD Security Proof Workshop 2020*, University of Waterloo & University of Toronto, Canada, July 15-17, 2020 (Online).

(7-4) **M. Hayashi**, "Quantum Private Information Retrieval with Multiple Servers," *The 2019 Workshop on Probability and Information Theory (WPI 2019)* The University of Hong Kong, August 19-22, 2019.

(7-5) **M. Hayashi**, "Verification of commuting quantum computations via fidelity estimation of weighted graph states," *Mini-Workshop on Quantum Verification*, Fudan University, Shanghai, China, August 16-18, 2019.

(7-6) **M. Hayashi**, "Secure Quantum Network Code without Classical Communication," *Summer Workshop on Quantum Algorithm and Quantum Software* Peng Cheng Laboratory, Shenzhen, China, August 12 - 16, 2019.

(7-7) **M. Hayashi**, "Verification of commuting quantum computations via fidelity estimation of weighted graph states," *Quantum information and string theory 2019* Yukawa Institute for Theoretical Physics (YITP), Kyoto University, Kyoto, Japan, May 27-June 28, 2019.

(7-8) **M. Hayashi**, "Perfect Discrimination of Non-Orthogonal Separable Pure States on Bipartite System in General Probabilistic Theory" *Interactions between Noncommutative Analysis and Quantum Information Theory* Institute for Advanced Study in Mathematics, Harbin Institute of Technology, June 1-5, 2019.

(7-9) **M. Hayashi**, "Asymptotic decoupling property and mixing condition and Hidden Markovian Process in quantum system," *Mathematical Aspects in Current Quantum Information Theory 2019 (MAQIT 2019)*, Seoul National University, Seoul, Korea, May 20-24, 2019.

(7-10) **M. Hayashi**, "Finite-length security analysis in quantum key distribution," *2019 Annual meeting for quantum information of the Chinese Institute of Electronics*, Jinan, China, May 11-12, 2019.

(7-11) **M. Hayashi**, "Measurement-Based Quantum Computation and Its Verification," *Second Hong Kong-Shenzhen Workshop on Quantum Information Science*, Southern University of Science and Technology, Shenzhen, China, November 26 - 29 2018.

(7-12) **M. Hayashi**, "Secure physical layer network coding versus secure network coding," *2018 IEEE Information Theory Workshop*, Guangzhou, China, November 25 – 29, 2018.

(7-13) **M. Hayashi**, "Quantum stopwatch: How to store time in a quantum memory," *Wolfson - SUSTech meeting*, Wolfson College, Oxford, UK, November, 6 – 8, 2018.

(7-14) **M. Hayashi**, "Verification of Measurement-Based Quantum Computation," *AQIS2018 Kyoto satellite workshop on quantum computing*, Panasonic Auditorium, Yukawa Hall, Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto, Japan September 13, 2018.

(7-15) **M. Hayashi**, "Attaining the ultimate precision limit in quantum state estimation," *International Workshop on Quantum Tomography (IWQT)*, Fudan University, Shanghai, China, July 30 - August 3, 2018.

(7-16) **M. Hayashi**, "Attaining the ultimate precision limit in quantum state estimation," *Hong Kong-Shenzhen Workshop on Quantum Information Science*, Southern University of Science and Technology, Shenzhen, China, May 21-24 2018.

(7-17) **M. Hayashi**, "Secure wireless communication and its application to satellite communication," Japan-Singapore Workshop on Coding and Information Theory, School of Physical & Mathematical Sciences, Nanyang Technological University, Singapore, March 4-7, 2018.

(7-18) **M. Hayashi**, "Asymptotic decoupling property and mixing condition and Hidden Markovian Process in quantum system," Hong Kong Workshop on Quantum Information Foundations: Focus on Physics of the Observer, Department of Computer Science, University of Hong Kong, Hong Kong, January 8-11, 2018.

(7-19) **M. Hayashi**, "Verification of Measurement-Based Quantum Computation," *IHP conference on Quantum Information Theory.*, Institut Henri Poincaré, Paris, France, December 11- 15, 2017.

(7-20) **M. Hayashi**, "Verification of Measurement-Based Quantum Computation," *International Workshop on Quantum Computing and Quantum Information Processing 2017*, Academy of Mathematics and Systems Science, Beijing, China, November 12 - 14, 2017.

(7-21) **M. Hayashi**, "Asymptotic Analysis for Hidden Markovian Process with Quantum Hidden System," *2017 IEEE Information Theory Workshop*, Kaohsiung, Taiwan, November 6 - 10, 2017.

(7-22) **M. Hayashi**, "Role of Hypothesis Testing in Quantum Information Theory," *Asian Conference on Quantum Information Science (AQIS 17)*, National University of Singapore, Singapore, September 4 - 8, 2017.

(7-23) **M. Hayashi**, "Verification of Measurement-Based Quantum Computation," *Trustworthy Quantum Information*, Université Pierre et Marie Curie, Paris, France, June 19 - 21, 2017.

(7-24) **M. Hayashi**, "Secure wireless communication under spatial and local Gaussian noise assumptions," *2016 Shannon Workshop*, Shanghai Jiao Tong University, Shanghai, December 14-16, 2016.

(7-25) **M. Hayashi**, "Implementable quadratic enhancement in quantum metrology," Hong Kong Workshop on Quantum Information and Foundations, Hong Kong, May 4-7, 2016.

(7-26) **M. Hayashi**, "Shannon Theoretic Analysis for Classical and Quantum Information Security," *Nexus of Information and Computation Theories, Secrecy and Privacy Theme*, Institut Henri Poincaré, Paris, France, March 21 - April 1, 2016.

(7-27) **M. Hayashi**, "Measurement-based Formulation of Quantum Heat Engine and Optimal Efficiency with Finite-Size Effect," *Beyond I.I.D. in Information theory*, Banff, Canada, July 5-10, 2015.

(7-28) **M. Hayashi**, "Classical and Quantum Information Theoretical Analysis for Security," *Mathematical Tools of Information-Theoretic Security Workshop*, Paris, France, September 23-25, 2015.

(7-29) **M. Hayashi**, "Information Geometry Approach to Estimation and Hypothesis Testing for Markov Chains," A Symposium on the History of Functional Analysis, Xi'an, China, May 8-11, 2015.

(7-30) **M. Hayashi**, "Tight asymptotic bounds on local hypothesis testing between a pure bipartite state and the white noise state," *Workshop on Quantum Metrology, Interaction, and Causal Structure*, Beijing, China, December 1–5, 2014.

(7-31) **M. Hayashi**, "Generalized entropies and quantum security," *AJW2014 Australia-Japan Workshop on Mutiuser Quantum Networks 2014*, University of Technology, Sydney, Sydney, Australia, October, 22 - 24, 2014

(7-32) **M. Hayashi**, "Finite-length analysis for secret random number generation and coding theorems," (in Organized Session: Classical and Quantum Secure Network) *2014 International Symposium on Information Theory and Its Applications (ISITA 2014)*, Melbourne, Australia, 26 - 29, October 2014.

(7-33) **M. Hayashi** and S. Watanabe, "Non-asymptotic and asymptotic analyses on Markov chains in several problems," *2014 Information Theory and Applications Workshop*, Catamaran Resort, San Diego (USA), February 9-14, 2014.

(7-34) **M. Hayashi**, "Estimation of group action with energy constraint and its application to uncertainty relations on S^1 and S^3," *Nagoya Winter Workshop on Quantum Information, Measurement, and Foundations*, Nagoya University, March 3-7, 2014.

(7-35) **M. Hayashi**, "Asymptotic conversion of probability distribution and entangled state," *Beyond I.I.D.*, National University of Singapore, May 19-21, 2014.

(7-36) **M. Hayashi**, "Generalized entropies," *New Frontiers of Quantum Information Theory*, Palazzo dei Capitani del Popolo, Ascoli Piceno (Italy), July, 7-11, 2014.

(7-37) **M. Hayashi**, "Estimation of group action under the energy constraint," *Workshop on Quantum Metrology, Interaction, and Causal Structure*, Beijing, China, December 9–13, 2013.

(7-38) T. Tsurumaru and **M. Hayashi**, "Dual universality of hash functions and its applications to quantum cryptography," *Third International Quantum Science Symposium Asia-2013 on 'Quantum Information to Communications & Quantum Systems to Spintronics, Semi-conductors'*, Tokyo, Japan, November 25 – 26, 2013.

(7-39) **M. Hayashi**, "Large deviation type evaluation in information theoretic security," *Workshop on Beyond i.i.d. in information theory*, Cambridge, UK, January, 8–11, 2013.

(7-40) **M. Hayashi**, "Large deviation type evaluation in information theoretic security," *Japan-Singapore Workshop on Multi-user Quantum Networks*, Centre for Quantum Technologies, National University of Singapore, Singapore, September, 17–20, 2012.

(7-41) **M. Hayashi**, "Security bound with privacy amplification in quantum system," *The International Symposium on Quantum Information and Quantum Logic*, Zhejiang University, Hangzhou, China, August, 10–13, 2012.

(7-42) **M. Hayashi**, "Weaker entanglement guarantees stronger entanglement," *5th Asia-Pacific Workshop on Quantum Information Science (5th APWQIS)*, Nanyang Technological University, Singapore, May, 25–28, 2011.

(7-43) **M. Hayashi**, "Phase estimation with photon number constraint," *2nd International Conference on Quantum Information and Technology*, National Institute of Informatics, Tokyo, Japan, October, 21–22, 2010.

(7-44) **M. Hayashi**, "Quantum statistical state estimation and quantum Cramer-Rao bound," *IISA-ISPS 2010 International Conference on Statistics, Probability, Operations Research, Computer Science and Allied Areas*, Department of Statistics, Andhra University, Visakhapatnam, India, 4–7, January, 2010. (This is one conference to celebrate the 90th birthday of Professor C. R. Rao, who is the most influential leading researcher in Statistics.)

(7-45) **M. Hayashi**, "Quantum statistical state estimation and quantum Cramer-Rao bound," *International Conference on Frontiers of Interface between Statistics and Sciences*, Hyderabad, India, 30 December 2009–2 January 2010. (This is the other conference to celebrate the 90th birthday of Professor C. R. Rao, who is the most influential leading researcher in Statistics.)

(7-46) **M. Hayashi**, "Quantum universal coding protocols and universal approximation of multi-copy states," *International Conference on Quantum Information and Technology*, National Institute of Informatics, Tokyo, Japan, 2–5, December, 2009.

(7-47) **M. Hayashi**, "Quantum key distribution I & II," *EQuaLS3, Expository Quantum Lecture Series 3*, Institute for Mathematical Research and Physics Department, Faculty of Science, University Putra Malaysia, Malaysia, 9–13, November, 2009.

(7-48) **M. Hayashi**, "Quantum universal coding protocols and universal approximation of multi-copy states," *OCPA6 The 6th Joint Meeting of Chinese Physicists Worldwide International Conference on Physics Education and Frontier Physics*, Lanzhou, China, August, 3–7, 2009.

(7-49) **M. Hayashi**, "Quantum capacity and degraded channel," *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.

(7-50) **M. Hayashi**, "Universal information protocols in quantum information theory," *Information and Communication*, Alfred Rényi Institute of Mathematics, Hungary, August, 25–28, 2008. (This is the conference to celebrate the 70th birthday of Professor Imré Csiszár, who is a leading researcher in Information Theory.)

(7-51) **M. Hayashi**, "Theoretical analysis and implementation on QKD with the decoy-state method," *KIAS-KAIST 2007 Workshop on Quantum Information Science*, KIAS, Seoul, Korea, June, 26–27 (2007).

(7-52) **M. Hayashi**, "Theoretical analysis and implementation on QKD with the decoy-state method," *Third Asia Pacific Conference on Quantum Information Science*, Nanyang Executive Center, Singapore, 30 July – 2 August, 2007.

(7-53) **M. Hayashi**, "State Discrimination of Entangled State by Local Operations," *Noise Information & Complexity Quantum Scale*, Ettore Majorana Centre, Erice (Sicily), Italy, November, 4 – 10, 2007.

(7-54) **M. Hayashi**, K. Matsumto, A. Tomita, B.-S. Shi, Y. Tsuda, and Y.K. Jiang: "Testing for Maximally Entangled State (Theory and Experiment)," *15th International Laser Physiscs workshop (LPHYS'06)*, EPFL, Lausanne, Switzerland, July, 24 – 28, 2006.

(7-55) **M. Hayashi**: "Practical Evaluation of Security for Quantum Key Distribution," *A conference on Quantum Statistics, Information and Control*, Nottingham, UK, July, 15 – 22, 2006.

(7-56) **M. Hayashi**, "Statistical analysis on testing of an entangled state based on Poisson distribution framework," *FOCUS MEETING: QUANTUM PROCESS ESTIMATION*, Budmerice, Slovakia, September 27–30, 2006.

(7-57) **M. Hayashi**: "Estimation of squeezed state," *9th International Conference on Squeezed States and Uncertainty Relations (ICSSUR 2005)*, Besancon, France, May 2 – 6, 2005.

(7-58) **M. Hayashi**: "Characterization of several kinds of quantum analogues of relative entropy," *2nd International Symposium on Information Geometry and its Applications*, University of Tokyo, Tokyo, December 12 – 16, 2005.

(7-59) **M. Hayashi**: "Quantum statistical inference and entanglement," *Special Week on Quantum Statistics*, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, October, 2004.

(7-60) **M. Hayashi**: "Hypothesis Testing Approach to Quantum Information Theory," *1st Asia-Pacific Conference on Quantum Information Science*, National Cheng Kung University, Tainan, Taiwan, December 10–13, 2004.

(7-61) **M. Hayashi**: "Quantum central limit theorem and quantum estimation," *Joint MaPhySto and QUANTOP Workshop on Quantum Measurements and Quantum Stochastics*, Department of Mathematical Sciences, University of Aarhus, Denmark, August 7 – 12, 2003.

(7-62) **M. Hayashi**: "Can quantum non-locality improve quantum estimation?" *Non-locality of Quantum Mechanics and Statistical Inference*, Kyoto, Japan, September, 8 – 9, 2003.

(7-63) **M. Hayashi**: "Hypothesis testing approach to quantum information theory," *COE Symposium on Quantum Information Theory*, Kyoto, Japan, September 2–3, 2003.