参考文献

[1] C. Adami and N. J. Cerf, "On the von Neumann capacity of noisy quantum channels," Phys.Rev. A56 3470, (1997); quant-ph/9610005 (1996).

[2] D. Aharonov, A. Kitaev and N. Nisan, "Quantum Circuits with Mixed States," In *Proceedings of the Thirtieth Annual ACM Symposium on Theory of Computation (STOC)*, pages 20-30, (1997); quant-ph/9806029 (1998).

[3] R. Ahlswede and G. Dueck, "Identification via channels," *IEEE Trans. Info. Theor.*, **35**, 15-29 (1989).

[4] R. Ahlswede and A. Winter, " Strong Converse for Identification via Quantum Channels," *IEEE Trans. Info. Theor.*, **48**, 569-579 (2002); quant-ph/0012127 (2000).

[5] S. Amari, *Differential-Geometrical Methods in Statistics*, Lecture Notes in Statistics, Vol. 28 (Springer, Berlin, 1985).

[6] H. Araki and E. Lieb, "Entropy inequalities," *Comm. Math. Phys.*, **18**, 160-170 (1970).

[7] S. Arimoto, "An algorithm for calculating the capacity of an arbitrary discrete memoryless channel," *IEEE Trans. Inform. Theory*, **18**, 14-20 (1972).

[8] E. Arthurs and M. S. Goodman, "Quantum Correlations: A Generalized Heisenberg Uncertainty Relation," *Phys. Rev. Lett.*, **60**, 2447-2449 (1988).

[9] E. Arthurs and J. L. Kelly, Jr., "On the Simultaneous Measurement of a Pair of Conjugate Observables," *Bell Syst. Tech.*, **44**, 725-729 (1965).

[10] R. R. Bahadur, *Sankhyā*, **22**, 229 (1960).

[11] R. R. Bahadur, *Ann. Math. Stat.*, **38**, 303, (1967).

[12] R. R. Bahadur, *Some limit theorems in statistics,* Regional Conf. Series in Applied Mathematics, no 4, SIAM, Philadelphia, (1971).

[13] M. Ban, K. Kurokawa, R. Momose and O. Hirota, "Optimum Measurements for Discrimination among Symmetric Quantum States and Parameter Estimation," *International Journal of Theoretical Physics* **36**, 1269 (1997).

[14] H. Barnum, C. A. Fuchs, R. Jozsa and B. Schumacher, "A General Fidelity Limit for Quantum Channels," *Phys. Rev. A*, **54**, 4707-4711 (1996); quant-ph/9603014 (1996).

[15] H. Barnum, E. Knill and M. A. Nielsen, "On Quantum Fidelities and Channel Capacities," *IEEE Trans. Info. Theor.*, **46**, 1317-1329 (2000); quant-ph/9809010 (1998).

[16] H. Barnum, M. A. Nielsen and B. Schumacher "Information transmission through a noisy quantum channel," *Phys. Rev. A*, **57**, 4153-4175, (1997); quant-ph/9702049 (1997).

[17] C. H. Bennett, H. J. Bernstein, S. Popescu, and B. Schumacher "Concentrating partial entanglement by local operations," *Phys. Rev. A*, **53**, 2046, (1996); quant-ph/9511030

(1995).

[18] C. H. Bennett and G. Brassard, "Quantum Cryptography: Public key distribution and coin tossing," *Proc. IEEE Int. Conf. Computers, Systems and Signal Processing*, (Bangalore, India), pp. 175179, (1984).

[19] C. H. Bennett, G. Brassard, C. Crepeau, R. Jozsa, A. Peres and W. K. Wootters, "Teleporting an unknown quantum state via dual classical and Einstein-Podolsky-Rosen channels," *Phys. Rev. Lett.*, **70**, 1895, (1993).

[20] C. H. Bennett, D. P. DiVincenzo, J. A. Smolin, W. K. Wootters "Mixed State Entanglement and Quantum Error Correction," *Phys. Rev. A*, **54** 3824-3851 (1996). quant-ph/9604024 (1996).

[21] C. H. Bennett, P. W. Shor, J. A. Smolin, and A. V. Thapliyal. "Entanglement-assisted classical capacity of noisy quantum channels," *Phys. Rev. Lett.*, **83** 3081, (1999); quant-ph/9904023 (1999).

[22] C. H. Bennett and S. J. Wiesner, "Communication via one- and two-particle operators on Einstein-Podolsky-Rosen states," *Phys. Rev. Lett.*, **69**, 2881, (1992).

[23] A. Ben-Tal and A. Nemirovski, *Lectures on Modern Convex Optimization*, (SIAM/MPS, 2001).

[24] R. Bhatia, *Matrix analysis* (Springer-Verlag, New York, 1997).

[25] I. Bjelakovic, T. Kruger, R. Siegmund-Schultze, and A. Szkola, "The Shannon-McMillan Theorem for Ergodic Quantum Lattice Systems," Inventiones Mathematicae **155**, 203-222 (2004); http://lanl.arxiv.org/math.DS/0207121 (2002).

[26] I. Bjelakovic and A. Szkola, "The Data Compression Theorem for Ergodic Quantum Information Sources," quant-ph/0301043 (2003).

[27] D. Blackwell, L. Breiman and A.J. Thomasian, "The capacity of a class of channels," *Ann. Math. Stat.*, **30**, 1229-1241, (1959).

[28] R. Blahut, "Computation of channel capacity and rate distortion functions," *IEEE Trans. Inform. Theory*, **18**, 460-473, (1972).

[29] G. Blakely, "Safeguarding cryptographic keys," *Proc. AFIPS* **48**, 313 (1979).

[30] S. Bose, M. B. Plenio, and B. Vedral, "Mixed state dense coding and its relation to entanglement measures," *J. Mod. Opt.*, **47** 291, (2000); quant-ph/9810025 (1998).

[31] D. Bouwmeester, J.-W. Pan, K. Mattle, M. Eibl, H. Weinfurter and A. Zeilinger, "Experimental quantum teleportation," *Nature*, **390**, 575-579 (1997).

[32] G. Bowen, "Classical information capacity of superdense coding," *Phys. Rev. A*, **63**, 022302, (2001); quant-ph/0101117 (2001).

[33] D. Bruss, A. Ekert, and C. Machiavello, "Optimal universal cloning and state estimation," quant-ph/9712019.

[34] M. V. Burnashev and A. S. Holevo, "On Reliability Function of Quantum Communication Channel," *Problems of Information Transmission*, **34**, 97-107 (1998); quant-ph/9703013

(1997).

[35] P. Busch, M. Grabowski, and P. J. Lahti, *Operational Quantum Physics*, Series: Lecture Notes in Physics, Vol. 31, (Springer, 1997).

[36] A. R. Calderbank, E. M. Rains, P. W. Shor, and N. J. A. Sloane, "Quantum Error Correction and Orthogonal Geometry," *Phys. Rev. Lett.*, **78**, 405 (1996).

[37] A.R. Calderbank and P.W. Shor, "Good quantum error-correcting codes exist," *Phys. Rev. A.*, **54**, 1098 (1996); quant-ph/9512032 (1995).

[38] H. Chernoff, *Ann. Math. Stat.*, **23**, 493-507 (1952).

[39] M.-D. Choi, "Completely Positive Linear Maps on Complex Matrices," *Linear Algebra and its Applications*, **10**, 285-290 (1975).

[40] R. Cleve, D. Gottesman, and H.-K. Lo, "How to share a quantum secret," *Phys. Rev. Lett.* **82**, 648 (1999); quant-ph/9901025 (1999).

[41] I. Csiszár, "Information type measures of difference of probability distribution and indirect observations, " *Studia Scientiarum Mathematicarum Hungarica,* **2**, 299-318, (1967).

[42] E. B. Davies and J. T. Lewis, *Com. Math. Phys.*, **17**, 203, (1970).

[43] L. D. Davisson, Proc. IEEE, **54**, 2010, (1966).

[44] I. Devetak, "The private classical information capacity and quantum information capacity of a quantum channel," quant-ph/0304127, (2003).

[45] I. Devetak, P. W. Shor, "The capacity of a quantum channel for simultaneous transmission of classical and quantum information," quant-ph/0311131 (2003).

[46] I. Devetak and A. Winter, "Classical data compression with quantum side information," *Phys. Rev. A*, **68**, 042301 (2003); quant-ph/0209029 (2002).

[47] I. Devetak and A. Winter, "Distillation of secret key and entanglement from quantum states," quant-ph/0306078 (2003).

[48] D. DiVincenzo, P. Shor, and J. Smolin, "Quantum channel capacities of very noisy channels," *Phys. Rev. A*, **57**, 830-839, (1998); quant-ph/9706061 (1997).

[49] W. Dür, G. Vidal and J. I. Cirac, "Visible compression of commuting mixd state," *Phys. Rev. A*, **64**, 022308 (2001); quant-ph/0101111 (2001).

[50] A. Einstein, R. Podolsky and N. Rosen, "Can quantum-mechanical description of physical reality be considered complete?," *Phys. Rev.*, **47**, 777-780 (1935).

[51] I. Ekeland and R. Téman, *Convex Analysys and Variational Problems*, (North-Holland, 1976); (SIAM, 1999).

[52] H. Fan, K. Matsumoto, and M. Wadati, "Quantum Cloning Machines of a d-level System," *Phys. Rev. A*, **64**, 064301 (2001); quant-ph/0103053 (2001).

[53] H. Fan, K. Matsumoto, X. Wang, and M. Wadati, "Quantum cloning machines for equatorial qubits," *Phys. Rev. A*, **65**, 012304 (2002). quant-ph/0101101 (2001).

[54] M. Fannes, "A continuity property of the entoropy density for spin lattice systems," *Com. Math. Phys.*, **31**, 291-294 (1973).

[55] A. Feinstein, "A new basic theorem of information theory," *IRE Trans. PGIT*, **4**, 2-22, (1954).

[56] G. D. Forney, Jr., S. M. Thesis, MIT 1963 (unpublished).

[57] J. C. Fu, *Ann. Stat.*, **1**, 745, (1973).

[58] C. A. Fuchs, "Distinguishability and Accessible Information in Quantum Theory," quant-ph/9601020, (1996).

[59] 藤原 彰夫, "量子状態の統計的推定理論," 東京大学大学院工学系研究科計数工学専攻, 修士論文, (1993).

[60] A. Fujiwara, "A Geometrical Study in Quantum Information Systems," doctoral thesis (1995).

[61] 藤原 彰夫, 長岡浩司への私信, (1996).

[62] A. Fujiwara, "Geometry of quantum information systems," In *Geometry in Present Day Science*, edited by O. E. Barndorff-Nielsen and E. B. V. Jensen, 35-48, Singapore: World Scientific, (1998).

[63] A. Fujiwara, "Quantum Birthday Problems: Geometrical Aspects of Quantum Random Coding," *IEEE Trans. Infro. Theor.*, **47**, 2644-2649 (2001).

[64] A. Fujiwara, "Quantum channel identification problem," *Phys. Rev. A*, **63**, 042304 (2001).

[65] A. Fujiwara, "Estimation of SU(2) operation and dense coding: An information geometric approach," *Phys. Rev. A*, **65**, 012316 (2002).

[66] 藤原彰夫, 量子通信路符号化–Holevo の主題と変奏– 電子情報通信学会誌, **85**, 586-590 (2002).

[67] 藤原彰夫, 量子通信路の数理, 数理科学 No. 474 (特集・数理工学の地平) 28-35 (2002).

[68] A. Fujiwara and H. Nagaoka, "Quantum Fisher metric and estimation for pure state models," *Phys. Lett.*, **201A**, 119-124 (1995);

[69] A. Fujiwara and H. Nagaoka, "Coherency in view of quantum estimation theory," in *Quantum coherence and decoherence*, edited by K. Fujikawa and Y. A. Ono, (Elsevier, Amsterdam, 1996), pp.303-306.

[70] A. Fujiwara and H. Nagaoka, "Operational capacity and pseudoclassicality of a quantum channel," *IEEE Trans. Infro. Theor.*, **44**, 1071-1086 (1998).

[71] A. Fujiwara and H. Nagaoka, "An estimation theoretical characterization of coherent states," *J. Math. Phys.*, **40**, 4227-4239 (1999).

[72] A. Fujiwara and P. Algoet, "One-to-one parametrization of quantum channels," *Phys. Rev. A*, **59**, 3290-3294 (1999).

[73] A. Fujiwara and H. Imai, "Quantum parameter estimation of a generalized Pauli channel," *J. Phys. A: Math. and Gen.*, **36**, 8093-8103 (2003).

[74] M. Fujiwara, M. Takeoka, J. Mizuno and M. Sasaki, "Exceeding classical capacity limit in quantum optical channel," *Phys. Rev. Lett.*, **90**, 167906, (2003); quant-ph/0304037 (2003).

[75] A. Furusawa, J. L. Sørensen, S. L. Braunstein, C. A. Fuchs, H. J. Kimble, and E. J.

Polzik, *Science*, **282**, 706, (1998).

[76] R. G. Gallager, *Information Theory and Reliable Communication*, (John Wiley & Sons, 1968).

[77] R. Gill and S. Massar, "State estimation for large ensembles," *Phys. Rev. A*, **61**, 042312 (2000); quant-ph/9902063 (1999).

[78] N. Giri and W. von Waldenfels, "An algebraic version of the central limit theorem," *Z. Wahrscheinlichkeitstheorie Verw. Gebiete*, **42**, 129-134 (1978).

[79] J. P. Gordon, "Quantum effects in communication systems," *Proc. IRE*, **50**, 1898-1908 (1962).

[80] J. P. Gordon, "Noise at optical frequencies; information theory," in *Quantum Electronics and Coherent Light*, *Proc. Int. School Phys. "Enrico Fermi", Course XXXI*, ed. P. A. Miles, pp.156-181 (Academic Press, New York 1964).

[81] D. Gottesman, "Class of quantum error-correcting codes saturating the quantum Hamming bound," *Phys. Rev. A*, **54**, 1862 (1996).

[82] D. Gottesman, "On the Theory of Quantum Secret Sharing," *Phys. Rev. A*, **61**, 042311 (2000); quant-ph/9910067 (1999).

[83] J. Gruska and H. Imai, "Power, puzzles and properties of entanglement," In Machines, Computations, and Universality, Third International Conference, MCU 2001, volume 2055 of Lecture Notes in Computer Science, pages 25-68, 2001.

[84] J. Gruska, H. Imai, and K. Matsumoto, "Power of quantum entanglement," In Foundations of Information Technology in the Era of Networking and Mobile Computing, IFIP 17th World Computer Congress - TC1 Stream / 2nd IFIP International Conference on Theoretical Computer Science, volume 223 of IFIP Conference Proceedings, pages 3-22, 2001.

[85] M. Hamada, "Lower Bounds on the Quantum Capacity and Highest Error Exponent of General Memoryless Channels," *IEEE Trans. Infor. Theor.*, **48**, 2547-2557, (2002); quant-ph/0112103, (2002).

[86] T.S. Han, "Hypothesis testing with the general source," *IEEE Trans. Info. Theor.*, **46**, 2415-2427, (2000).

[87] T.S. Han, "The reliability functions of the general source with fixed-length coding," *IEEE Trans. Info. Theor.*, **46**, 2117-2132, (2000).

[88] T. S. Han and K. Kobayashi, *IEEE Trans. Info. Theor.*, **35**, 178-180 (1989).

[89] 韓太舜 小林欣吾, 情報と符号化の数理, 培風館, (1999).

[90] T.S. Han and S. Verdú, "Approximation theory of output statistics," *IEEE Trans. Info. Theor.*, **39**, 752 - 772, (1993).

[91] A. Harrow and H. K. Lo, "A tight lower bound on the classical communication cost of entanglement dilution," quant-ph/0204096 (2002).

[92] P. Hausladen, R. Jozsa, B. Schumacher, M. Westmoreland, W. Wooters, "Classical infor-

mation capacity of a quantum channel," *Phys. Rev. A* **54**, 1869-1876 (1996).

[93] 林 正人, "量子局所不偏測定に対する誤差の最小化," 京都大学大学院理学研究科数学数理解析専攻（数学系）修士論文 (1996).

[94] M. Hayashi, "A Linear Programming Approach to Attainable Cramer-Rao type bound and Randomness Conditions," Kyoto-Math 97-08; quant-ph/9704044.(1997).

[95] M. Hayashi, "A Linear Programming Approach to Attainable Cramer-Rao type bound," in *Quantum Communication, Computing, and Measurement*, edited by O.Hirota, A.S. Holevo, and C.M.Caves, (Plenum, New York, pp. 99-108.(1997)

[96] M. Hayashi, "Asymptotic estimation theory for a finite dimensional pure state model," *J. Phys. A: Math. and Gen.*, **31**, 4633-4655 (1998); quant-ph/9704041 (1997).

[97] M. Hayashi, "Asymptotics of quantum relative entropy from a representation theoretical viewpoint," *J. Phys. A: Math. and Gen.*, **34**, 3413-3419 (2001). quant-ph/9704040, (1997).

[98] M. Hayashi, "Asymptotic quantum estimation theory for the thermal states family," in *Quantum Communication, Computing, and Measurement 2*, edited by P. Kumar, G. M. D'ariano and O. Hirota, (Plenum, New York, 2000) pp.99-104; quant-ph/9809002 (1998).

[99] 林正人 "量子推定理論における漸近的大偏差型評価について," シンポジウム「統計的推測理論とその情報論的側面」予稿集. pp.53-82 (1998).

[100] 林正人 "非可換物理量の同時測定について," 数理解析研究所講究録「無限次元非可換解析学の展開」No.1099, 96-118 (1999).

[101] 林正人 "サンプル間の量子相関を用いた状態推定," 第 7 回「非平衡系の統計物理」シンポジウム報告集, 物性研究 2000 年 1 月号 (Vol. 73 No. 4), 680-703.

[102] 林正人, 量子推定における今後の課題, 日本数学会 2001 年度年会統計数学分科会講演予稿集, pp.61-82 (2001).

[103] 林 正人, 一般量子情報源における量子仮説検定, 第 24 回情報理論とその応用シンポジウム予稿集, pp.591-594 (2001).

[104] M. Hayashi, "Optimal sequence of POVMs in the sense of Stein's lemma in quantum hypothesis," quant-ph/0107004 (2001); "Optimal sequence of quantum measurements in the sense of Stein's lemma in quantum hypothesis testing," *J. Phys. A: Math. and Gen.*, **35**, 10759-10773 (2002).

[105] M. Hayashi, "Exponents of quantum fixed-length pure state source coding," *Phys. Rev. A*, **66**, 032321 (2002); quant-ph/0202002, (2002).

[106] M. Hayashi, "General formulas for fixed-length quantum entanglement concentration," quant-ph/0206187 (2002).

[107] 林正人, 量子系の統計推測（理論と応用）, 電子情報通信学会誌, Vol. 85, 600-605 (2002).

[108] M. Hayashi, "Two quantum analogues of Fisher information from a large deviation viewpoint of quantum estimation," *J. Phys. A: Math. and Gen.*, **35**, 7689-7727 (2002); quant-ph/0202003 (2002).

[109] 林正人, “量子推定と量子中心極限定理,” 日本数学会誌「数学」, 55 巻 4 号, 368-391, (2003).

[110] M. Hayashi, M. Koashi, K. Matsumoto, F. Morikoshi and A. Winter, “Error exponents for entangle concentration,” *J. Phys. A: Math. and Gen.* **36** 527-553 (2003); quant-ph/0206097 (2002).

[111] 林正人, 松本啓史, “測定自由度をもつ統計モデルと量子力学,” 数理解析研究所講究録 **1055**, 96-110 (1998).

[112] 林正人, 松本啓史, 量子系における統計的推測の最近の発展, 日本応用数理学会誌, Vol. 11, No. 3 Sep. 27-48 (2001).

[113] M. Hayashi and K. Matsumoto, “Variable length universal entanglement concentration by local operations and its application to teleportation and dense coding,” quant-ph/0109028 (2001).

[114] M. Hayashi and K. Matsumoto, “Quantum universal variable-length source coding,” *Phys. Rev.* A **66**, 022311 (2002); quant-ph/0202001 (2002).

[115] M. Hayashi and K. Matsumoto, “ Simple construction of quantum universal variable-length source coding,” *Quantum Information and Computation* Vol.2 Special Issue, 519-529 (2002); quant-ph/0209124, (2002).

[116] M. Hayashi and H. Nagaoka, “General formulas for capacity of classical-quantum channels,” *IEEE Trans. Inform. Theor.*, **49**, 1753-1768, 2003; quant-ph/0206186 (2002).

[117] M. Hayashi and F. Sakaguchi, “Subnormal operators regarded as generalized observables and compound-system-type normal extension related to su(1,1),” *J. Phys. A: Math. and Gen.*, **33**, 7793-7820 (2000); quant-ph/0003079.

[118] P. M. Hayden, M. Horodecki and B. M. Terhal, “The asymptotic entanglement cost of preparing a quantum state,” *J. Phys. A: Math. and Gen.*, **34**, 6891-6898 (2001); quant-ph/0008134 (2000).

[119] P. Hayden, R. Jozsa, and A. Winter, “Trading quantum for classical resources in quantum data compression,” *J. Math. Phys.* **43**, 4404-4444 (2002); quant-ph/0204038 (2002).

[120] P. Hayden, and A. Winter, “On the communication cost of entanglement transformations,” *Phys. Rev. A* **67**, 012326 (2003); quant-ph/0204092 (2002).

[121] C. W. Helstrom, “Detection theory and quantum mechanics,” *Inform. Contr.*, **10**, 254-291 (1976).

[122] C. W. Helstrom, “Minimum mean-square error estimation in quantum statistics,” *Phys. Lett.* **25A**, 101-102 (1976).

[123] F. Hiai and D. Petz, “The proper formula for relative entropy and its asymptotics in quantum probability,” *Com. Math. Phys.*, **143**, 99–114, (1991).

[124] 日合文雄, 柳研二郎, ヒルベルト空間と線形作用素, (牧野書店, 1995).

[125] T. Hiroshima, “Majorization criterion for distillability of a bipartite quantum state,” *Phys. Rev. Lett.* **91**, 057902 (2003); quant-ph/0303057 (2003).

[126] A. S. Holevo, “An analog of the theory of statistical decisions in noncommutative the-

ory of probability," *Trudy Moskov. Mat. Obšč.*, **26**, 133-149 1972. (English translation is *Trans. Moscow Math. Soc.*, **26**, 133-149 1972.)

[127] A. S. Holevo, "Bounds for the quantity of information transmitted by a quantum communication channel," *Problemly Peredachi Informatsii*, vol. 9, 3-11, 1973. (In Russian) (English Translation: *Probl. Inform. Transm.*, **9**, 177-183, 1975.)

[128] A. S. Holevo "Some statistical problems for quantum Gaussian states," *IEEE Trans. Inform. Theor.*, **21**, 533-543 (1975).

[129] A. S. Holevo, "On the capacity of quantum communication channel," *Problemly Peredachi Informatsii*, vol. 15, no. 4, pp. 3-11 (1979). (In Russian) (English Translation: *Probl. Inform. Transm.*, **15**, 247-253 1979.)

[130] A. S. Holevo, "Covariant measurements and uncertainty relations," *Rep. Math. Phys.*, **16**, 385-400, (1979).

[131] A. S. Holevo, "The capacity of the quantum channel with general signal states," *IEEE Trans. Inform. Theor.*, **44**, 269 (1998); quant-ph/9611023 (1996).

[132] A. S. Holevo, "On quantum communication channels with constrained inputs," quant-ph/9705054, (1997).

[133] A. S. Holevo, "Coding Theorems for Quantum Channels," *Tamagawa University Research Review*, no. 4, (1998); quant-ph/9809023 (1998).

[134] A. S. Holevo, "On entanglement-assisted classical capacity," *J. Math. Phys.*, **43**, 4326-4333 (2002); quant-ph/0106075

[135] A. S. Holevo, *Statistical Structure of Quantum Theory*, Series: Lecture Notes in Physics, Vol. 67, (Springer, 2001).

[136] A. S. Holevo and M. E. Shirokov, "On Shor's channel extension and constrained channels," quant-ph/0306196 (2003).

[137] M. Horodecki and P. Horodecki, "Reduction criterion of separability and limits for a class of distillation protocols," *Phys. Rev. A.* **59**, 4206 (1999); quant-ph/9708015 (1997).

[138] M. Horodecki, P. Horodecki and R. Horodecki, "Separability of mixd states: necessary and sufficient conditions," *Phys. Lett.*, **A 223**, 1-8 (1996).

[139] M. Horodecki, P. Horodecki and R. Horodecki, "Inseparable Two Spin- 1 / 2 Density Matrices Can Be Distilled to a Singlet Form," *Phys. Rev. Lett.* **78**, 574 (1997).

[140] M. Horodecki, P. Horodecki and R. Horodecki, "Mixed-state entanglement and distillation: is there a "bound" entanglement in nature?" *Phys. Rev. Lett.* **80**, 5239 (1998); quant-ph/9801069 (1998).

[141] M. Horodecki, P. Horodecki and R. Horodecki, "Unified Approach to Quantum Capacities: Towards Quantum Noisy Coding Theorem," *Phys. Re. Lett.*, **85**, 433-436 (2000).

[142] M. Horodecki, P. Horodecki, and R. Horodecki, "Mixed-state entanglement and quantum communication", in *Quantum Information: An Introduction to Basic Theoretical Concepts and Experiments* (Springer Tracts in Modern Physics, 173), Eds. G. Alber, T.

Beth, M. Horodecki, P. Horodecki, R. Horodecki, M. Rotteler, H. Weinfurter, R. Werner, and A. Zeilinger, Springer-Verlag (April 2001).

[143] M. Horodecki, P. Horodecki, R. Horodecki, D. W. Leung, and B. M. Terhal, "Classical capacity of a noiseless quantum channel assisted by noisy entanglement," *Quantum Information and Computation*, **1**, 70–78 (2001); quant-ph/0106080, (2001).

[144] M. Horodecki, P. Shor and M. B. Ruskai, "Entanglement breaking channels," *Rev. Math. Phys.,* **15**, 1-13, (2003); quant-ph/0302031, (2003).

[145] P. Horodecki, "Separability criterion and inseparable mixed states with positive partial transposition," *Phys. Lett.* **A232** 333 (1997); quant-ph/9703004 (1997).

[146] T. Hiroshima, "Optimal dense coding with mixd state entanglement," *J. Phys. A: Math. and Gen.*, **34**, 6907-6912 (2001). quant-ph/0009048 (2000)

[147] 井手俊毅, 小林孝嘉, 古澤明, "量子テレポーテーション," 数理科学 6 月号 24-29 (2001); 数理科学別冊「量子情報科学とその展開」168-173, (2003).

[148] H. Imai, M. Hachimori, M. Hamada, H. Kobayashi and K. Matsumoto, "Optimization in quantum computation and information," 2nd Japanese-Hungarian Symposium on Discrete Mathematics and Its Applications, Budapest, Hungary, (2001).

[149] S. Ishikawa, "Uncertainty relations in simultaneous measurements for arbitrary observables," *Rep. Math, Phys.*, **29**, 257-273 (1991).

[150] S. Ishizaka and T. Hiroshima, "Maximally entangled mixed states under nonlocal unitary operations in two qubits," *Phys. Rev. A*, **62**, 022310 (2000).

[151] R. Jozsa, "Fidelity for mixd quantum states," *J. Mod. Optics*, 41(12), 2315-2323, (1994).

[152] R. Jozsa and B. Schumacher, "A new proof of the quantum noiseless coding theorem," *J. Mod. Optics*, 41(12), 2343-2349, (1994).

[153] R. Jozsa, M. Horodecki, P. Horodecki and R. Horodecki, "Universal Quantum Information Compression," *Phys. Rev. Lett.*, **81**, 1714 (1998). quant-ph/9805017 (1998).

[154] A. Kaltchenko, E.-H. Yang, "Universal Compression of Ergodic Quantum Sources," *Quantum Information and Computation*, **3**, 359-375, (2003); quant-ph/0302174 (2003).

[155] M. Keyl and R. F. Werner, "Optimal cloning of pure states, judging single clones," *J. Math. Phys.* **40**, 3283-3299 (1999); quant-ph/9807010.

[156] M. Keyl and R. F. Werner, "Estimating the spectrum of a density operator," *Phys. Rev.* A **64**, 052311 (2001); quant-ph/0102027 (2001).

[157] C. King, "Additivity for a class of unital qubit channels," *J. Math. Phys.*, **43**, 4641-4653 (2002); quant-ph/0103156 (2001).

[158] C. King, "The capacity of the quantum depolarizing channel," quant-ph/0204172 (2002).

[159] E. Klarreich, "Quantum cryptography: Can you keep a secret?" *Nature*, **418**, 270 - 272 18 Jul (2002).

[160] E. Knill and R. Laflamme, *Phys. Rev. A*, **55**, 900 (1997).

[161] 小芦雅斗, "量子情報の圧縮解凍," 数理科学 2003 年 11 月号, 38-45, (2003).

[162] M. Koashi and N. Imoto, "Compressibility of Mixed-State Signals," Phys. Rev. Lett. **87**, 017902 (2001). quant-ph/0103128, (2001).

[163] M. Koashi and N. Imoto, "Quantum information is incompressible without errors," Phys. Rev. Lett. **89**, 097904, (2002). quant-ph/0203045, (2002).

[164] H. Kosaka, A. Tomita, Y. Nambu, N. Kimura, and K. Nakamura, "Single-photon interference experiment over 100 km for quantum cryptography system using a balanced gated-mode photon detector," Electron. Lett. 39, No. 16, pp. 1199-1201 (2003).

[165] K. Kraus, *States, Effects, and Operations*, Lecture Notes in Physiscs, Vol. 190, (Springer, Berlin, 1983).

[166] P. G. Kwiat, A. G. White, et al., *Phys. Rev.* A **60**, R773 (1999), *Phys. Rev. Lett.*, **83**, 3103 (1999), *Sience*, **290**, 498 (2000), *Nature*, **409**, 1014 (2001), qunat-ph/0108088 (2001).

[167] L. B. Levitin, "On quantum measure of information," Proceedings of the Fourth All-Union Conference on information trasmission and coding theory, pp. 111-115, Tashkent (1969), (In Russian) (English Translation: in *Information, Complexity and Control in Quantum Physics,* (edited by A. Blaquiere, S. Diner, G. Lochak) pp. 15-47, (Springer, New York, 1987).)

[168] E. Lieb, "Some convexity and subadditivity properties of entropies," *Bull. Am. Math. Soc.*, **81**, 1-13 (1975).

[169] E. Lieb and M. B. Ruskai, "A fundamental property of quantum mechanical entoropy," *Phys. Rev. Lett.*, **30**, 434-436, (1973).

[170] E. Lieb and M. B. Ruskai, "Proof of the strong subadditivity of quantum mechanical entoropy," *J. Math. Phys.*, **14**, 1938-1941, (1973).

[171] G. Lindblad, "Completely positive maps and entropy inequalities", *Com. Math. Phys.*, **40**, 147-151 (1975).

[172] S. Lloyd, "The capacity of the noisy quantum channel," *Phys. Rev. A*, **56** 1613, (1997); quant-ph/9604015 (1996).

[173] H.-K. Lo, "Proof of unconditional security of six-state quantum key distribution scheme," *Quant. Info. Comp.*, **1** 81-94, (2001).

[174] H.-K. Lo and S. Popescu, "Concentrating entanglement by local actions: Beyond mean values," *Phys. Rev. A* **63** 022301 (2001); quant-ph/9707038 (1997).

[175] T. J. Lynch, Proc. IEEE, **54**, 1490-1491, (1966).

[176] S. Massar and S. Popescu, "Optimal Extraction of Information from Finite Quantum Ensembles," *Phys. Rev. Lett.*, **74**, 1259 (1995).

[177] K. Matsumoto, "量子状態の幾何," 東京大学大学院工学系研究科計数工学専攻, 修士論文, (1995).

[178] K. Matsumoto, "A new approach to the Cramér-Rao type bound of the pure state model," *J. Phys. A: Math. Gen.*, **35**, 3111–3123 (2002); quant-ph/9704044 (1997).

[179] K. Matsumoto, "Uhlmann's parallelism in qunatum estimation theory," quant-ph/9711027 (1997).

[180] K. Matsumoto, "A geometrical approach to quantum estimation theory," doctoral thesis, Graduate School of Mathematical Sciences, University of Tokyo (1997).

[181] K. Matsumoto, "The asymptotic efficiency of the consistent estimator, Berry-Uhlmann' curvature and qunatum information geometry," in *Quantum Communication, Computing, and Measurement 2*, edited by P. Kumar, G. M. D'ariano and O. Hirota, (Plenum, New York, 2000), pp.105-110.

[182] 松本啓史, セミナー資料 (1999).

[183] K. Matsumoto, T. Shimono, and A. Winter, "Remarks on additivity of the Holevo channel capacity and of the entanglement of formation," *Comm. Math. Phys.* to apper; quant-ph/0206148 (2002).

[184] K. Matsumoto and F. Yura, "Entanglement Cost of Antisymmetric States and Additivity of Capacity of Some Quantum Channel," quant-ph/0306009.

[185] 松本隆太郎, 量子誤り訂正とエンタングルメント純粋化, 電子情報通信学会誌, Vol. 85, 591-595 (2002).

[186] Y. Mitsumori, J. A. Vaccaro, S. M. Barnett, E. Andersson, A. Hasegawa, M. Takeoka and M. Sasaki, "Experimental demonstration of quantum source coding," *Phys. Rev. Lett. to appear.*; quant-ph/0304036, (2003).

[187] A. Miyake, "Classification of multipartite entangled states by multidimensional determinants," *Phys. Rev. A* **67**, 012108 (2003); quant-ph/0206111 (2002).

[188] F. Morikoshi, "Recovery of entanglement lost in entanglement manipulation," *Phys. Rev. Lett.*, **84**, 3189 (2000); quant-ph/9911019

[189] F. Morikoshi and M. Koashi, "Deterministic entanglement concentration," *Phys. Rev. A*, **64** 022316 (2001); quant-ph/0107120 (2001).

[190] M. A. Morozowa and N. N. Chentsov, "Markov invariant geometry on state manifolds," *Itogi Nauki i Tehniki,* **36**, 289-304 (1990). (In Russian)

[191] 村尾美緒, エンタングルメントを利用した量子情報処理数理科学, 6 月号 30-38, (2001).

[192] M. Murao, D. Jonathan, M. B. Plenio, and V. Vedral, "Quantum telecloning and multiparticle entanglement," *Phys. Rev. A* **59** 156-161 (1999); quant-ph/9806082 (1998).

[193] 長岡浩司, 量子統計モデルの Fisher 情報量について, 第１０回情報理論とその応用シンポジウム予稿集, pp.241-246, (1987).

[194] H. Nagaoka "An Asymptotically Efficient Estimator for a One-dimensional Parametric Model of Quantum Statistical Operators," *Proc. 1988 IEEE International Symposium on Information Theory*, p.198, (1988).

[195] H. Nagaoka, "On the Parameter Estimation Problem for Quantum Statistical Models," 第１２回情報理論とその応用学会シンポジウム予稿集, 577-582 (1989).

[196] 長岡浩司, "エルミート行列の同時対角化のある一般化とその量子推定理論との関係について,"

日本応用数理学会論文誌, **1**, 305-318 (1991).

[197] 長岡浩司, 藤原彰夫への私信, (1991).

[198] 長岡浩司, Kullback divergence と Fisher information の関係について-古典系から量子系へ-情報理論とその応用学会ジョイントミニワークショップ「データ圧縮理論：現状と展望」「情報理論における基本的未解決問題」講演資料, 63-72 (1991.8 / 資料発行 1992.4).

[199] 長岡浩司, 量子状態推定の微分幾何, 数理科学 No.366 （特集・情報空間）, 46-52 (1993.12).

[200] H. Nagaoka, "Differential Geometrical Aspects of Quantum State Estimation and Relative Entropy," in *Quantum Communications and Measurement,* (edited by V. P. Belavkin, O. Hirota and R. L Hudson) Plenum, New York, 449-452 (1995).

[201] H. Nagaoka, "Algorithms of Arimoto-Blahut type for computing quantum channel capacity," *Proc. of 1998 IEEE International Symposium on Information Theory*, p.354, (1998).

[202] 長岡浩司, 量子仮説検定の情報スペクトル理論, 第２２回情報理論とその応用シンポジウム予稿集, 245-247 (1999).

[203] H. Nagaoka, "Strong converse thereoms in quantum information theory," *Proc. ERATO Workshop on Quantum Information Science 2001*, pp. 33, (2001).

[204] 長岡浩司, 量子情報理論における極限定理について, 数理科学 No.456 （特集・量子情報と量子コンピュータ）, 47-55 (2001.6).

[205] 長岡浩司, 量子情報幾何学の世界, 2002 年度日本数学会総合講演・企画特別講演アブストラクト, pp.24-37 (2002).

[206] 長岡浩司, 量子情報科学の来し方行く末, 電子情報通信学会誌, Vol. 85, 576-579 (2002).

[207] 長岡浩司・藤原彰夫, 量子情報理論と相対エントロピー, 数理科学 No.380 （特集・大偏差原理とその応用）, 50-55 (1995).

[208] H. Nagaoka and M. Hayashi, "An information-spectrum approach to classical and quantum hypothesis testing," quant-ph/0206185 (2002).

[209] 長岡浩司, 大澤進, "Theoretical basis and applications of the quantum Arimoto-Blahut algorithms," 第 2 回量子情報技術研究会資料, 107-112, (2003).

[210] M. A. Nielsen, "Conditions for a Class of Entanglement Transformations," *Phys. Rev. Lett.*, **83**, 436, (1999); quant-ph/9811053 (1998).

[211] Naĭmark, Comptes Rendus (Doklady) de l'Acadenie des Sience de l'URSS, vol. **41**, No. **9**, 359, (1943).

[212] M. A. Nielsen and J. Kempe, "Separable States Are More Disordered Globally than Locally," Phys. Rev. Lett., 86, 5184-5187 (2001); quant-ph/0011117, (2000).

[213] J. von Neumann, *Mathematical Foundations of Quantum Mechanics*, (Princeton University Press, Princeton, NJ, 1955); ドイツ語版 (1932); 邦訳 井上, 広重, 恒藤訳, 量子力学の数学的基礎, (みすず書房, 1957).

[214] 小川 朋宏, 量子力学系における仮説検定と通信路符号化の漸近特性に関する研究, 電気通信大学大学院情報システム学研究科 学位申請論文 (2000).

[215] T. Ogawa and H. Nagaoka, "Strong converse to the quantum channel coding theorem," *IEEE Trans. Inform. Theor.*, **45**, 2486-2489 (1999); quant-ph/9808063 (1998).

[216] T. Ogawa and H. Nagaoka, "Strong converse and Stein's lemma in quantum hypothesis testing," *IEEE Trans. Inform. Theory*, **46**, 2428-2433 (2000); quant-ph/9906090 (1999).

[217] T. Ogawa and H. Nagaoka, "A New Proof of the Channel Coding Theorem via Hypothesis Testing in Quantum Information Theory," *Proc. 2002 IEEE International Symposium on Information Theory*, p.73. (2002); quant-ph/0208139 (2002).

[218] T. Ogawa and M. Hayashi, "On Error Exponents in Quantum Hypothesis Testing," quant-ph/0206151 (2002).

[219] M. Ohya and D. Petz, *Quantum Entropy and Its Use,* (Springer, New York, 1993).

[220] M. Ohya, D. Petz and N. Watanabe, "On capacities of quantum channels," *Prb. Math. Stat.*, vol.17, 179–196, 1997.

[221] S. Osawa and H. Nagaoka, "Numerical experiments on the capacity of quantum channel with entangled input states," *IEICE Trans.*, vol.E84-A, 2583–2590, 2001; quant-ph/0007115 (2000).

[222] M. Ozawa, J. Math. Phys. **25**, 79 (1984).

[223] M. Ozawa, "Quantum limits of measurements and uncertainty principle, in Quantum Aspects of Optical Communications," *Lecture Notes in Physics, Vol. 378*, edited by C. Bendjaballah and O. Hirota and S. Reynaud (Springer, Berlin, 1991), pp. 3–17.

[224] M. Ozawa, "Quantum State Reduction and the Quantum Bayes Principle," in *Quantum Communication, Computing, and Measurement*, edited by O. Hirota and A. S. Holevo and C. M. Caves (Plenum, New York, 1997), pp. 233–241.

[225] M. Ozawa, "An Operational Approach to Quantum State Reduction," *Ann. Phys.*, **259**, 121–137 (1997); quant-ph/9706027.

[226] M. Ozawa, "Quantum State Reduction: An Operational Approach", *Fortschr. Phys.*, 46 615–625 (1998); quant-ph/9711006.

[227] M. Ozawa, "Operational characterization of simultaneous measurements in quantum mechanics," *Phys. Lett. A*, **275**, 5 - 11 (2000); quant-ph/9802039.

[228] 小澤正直, "観測理論の数理," 江沢洋編「数理物理への誘い３」(遊星社, 2000), pp.163-189.

[229] M. Ozawa, "Measurements of nondegenerate discrete observables," *Phys. Rev. A* **63**, 062101 (2000); quant-ph/0003033 (2000).

[230] M. Ozawa, "Operations, disturbance, and simultaneous measurability," *Phys. Rev. A* **62**, 032109 (2001); quant-ph/0005054 (2000).

[231] M. Ozawa, "Universally valid reformulation of the Heisenberg uncertainty principle on noise and disturbance in measurement," *Phys. Rev. A*, **67**, 042105 (2003); quant-ph/0207121 (2002).

[232] M. Ozawa, "Physical Content of Heisenberg's uncertainty relation: limitation and reformulation," *Phys. Lett. A*, **318**, 21–29 (2003); quant-ph/0210044.

[233] M. Ozawa, "Uncertainty Principle For Quantum instruments and Computing," *Int. J. Quant. Info.*, **1**, 569-588 (2003).

[234] M. Ozawa, "Uncertainty relations for noise and disturbance in generalized quantum measurements," to appear in *Ann. Phys.*, quant-ph/0307057 (2003).

[235] 尾張正樹, S. Braunstein, 根本香絵, 村尾美緒, 無限次元空間における Schmidt rank の拡張, 第 9 回量子情報技術研究会資料, 101, (2003); M. Owari, K. Matsumoto, and M. Murao "Existence of incomparable pure bipartite states in infinite dimensional systems," quant-ph/0312091 (2003).

[236] J.-W. Pan, S. Gasparoni, M. Aspelmeyer, T. Jennewein and A. Zeilinger, "Experimental realization of freely propagating teleported qubits," *Nature*, **421**, 721-725 (2003).

[237] J.-W. Pan, S. Gasparoni, R. Ursin, G. Weihs, and A. Zeilinger, "Experimental entanglement purification of arbitrary unknown states," *Nature*, **423**, 417 - 422 (2003).

[238] D. Petz, "Quasi-entoropies for finite quantum systems," Rep. Math. Phys., **23**, 57-65, (1986).

[239] D. Petz, *An Invitation to the Algebra of Canonical Commutation Relations*, Leuven Notes in Mathematical and Theoretical Physics, Vol. 2, (1990).

[240] D. Petz, "Monotone Metrics on Matrix Spaces," *Linear Algebra and its Applications*, **224**, 81-96 (1996).

[241] D. Petz, M. Mosonyi, "Stationary Quantum Source Coding," *J. Math. Phys*, **42**, 48574864, (2001); quant-ph/9912103 (1999).

[242] D. Petz and C. Sudár "Extending the Fisher metric to density matrices," In O. E. Barndorff-Nielsen and E. B. V. Jensen (eds.), *Geometry in Present Day Science*, 21, (World Scientific, Singapore, 1998).

[243] D. Petz and G. Toth, *Lett. Math. Phys.* **27**, 205, (1993).

[244] H. P. Robertson, "The Uncertainty Principle," *Phys. Rev.*, **34**, 163 (1929).

[245] E. M. Rains, "Bound on distillable entanglement," *Phys. Rev.* A, **60**, 179-184 (1999).

[246] E. M. Rains, "A semidefinite program for distillable entanglement," *IEEE Trans. Inform. Theor.*, vol.47, 2921-2933 (2001); quant-ph/0008047 (2000).

[247] M. B. Ruskai, "Beyond strong subadditivity: improved bounds on the construction of generalized relative entropy," *Rev. Math. Phys.*, **6**, 1147-1161, (1994).

[248] M. B. Ruskai, S. Szarek and E. Werner, "An Analysis of Completely-Positive Trace-Preserving Maps on 2 × 2 Matrices," *Lin. Alg. Appl.*, **347**, 159-187 (2002); quant-ph/0101003 (2001).

[249] M. B. Ruskai, "Qubit Entanglement Breaking Channels," *Rev. Math. Phys.* to apper; quant-ph/0302032 (2003).

[250] J. J. Sakurai, *Modern Quantum Mechanics*, (Addison-Wesley, Mssachusetts, 1985). 邦訳 桜井明夫訳, 現代の量子力学, (吉岡書店, 1989).

[251] 佐々木雅英, 番雅司, "量子情報理論–量子効果を使う新しい情報操作とその性能限界を明らか

にする理論–” 日本物理学会誌, **57**, No. 1, 9-21 (2002).

[252] 佐々木雅英, “量子限界における符号化技術,” 数理科学 2003 年 11 月号, 23-29 (2003)

[253] B. Schumacher, “Quantum coding,” *Phys. Rev. A*, **51**, 2738-2747 (1995).

[254] B. Schumacher, “Sending quantum entanglement through noisy channels,” *Phys. Rev. A*, **54**, 2614-2628 (1996); quant-ph/9604023 (1996).

[255] B. Schumacher and M. A. Nielsen, “Quantum data processing and error correction,” *Phys. Rev. A*, **54**, 2629 (1996); quant-ph/9604022 (1996).

[256] B. Schumacher and M. D. Westmoreland, “Sending classical information via noisy quantum channels,” *Phys. Rev. A*, **56**, 131, (1997).

[257] B. Schumacher and M.D. Westmoreland, “Optimal signal ensembles,” *Phys. Rev. A*, **63**, 022308, (2001).

[258] A. Shamir, “How to share a secret,” *Communications of the ACM*, **22**, 612 (1979).

[259] C.E. Shannon, “A mathematical theory of communication,” *Bell System Technical Journal*, **27**, 623-656, (1948).

[260] C.E. Shannon, “Certain results in coding theory for noisy channels,” *Information and Control* **1**, 6-25, (1957).

[261] A. Shields ,et al., “Conference on Lasers and Electro-Optics (CLEO),” Baltimore, US, 5 June (2003)

[262] T. Shimono and H. Fan, “Numerical Test of Superadditivity of Entanglement of Formation for Four-Qubit States,” *Proc. ERATO Conference on Quantum Information Science 2003*, pp. 119-120 (2003).

[263] P. W. Shor, “Scheme for reducing decoherence in quantum computer memory,” *Phys. Rev. A*, **52**, 2493 (1995).

[264] P. W. Shor, “Additivity of the classical capacity of entanglement-breaking quantum channels,” *J. Math. Phys.*, **43**, 4334-4340, (2002); quant-ph/0201149 (2002).

[265] P. W. Shor, “The quantum channel capacity and coherent information,” *lecture notes, MSRI Workshop on Quantum Computation*, (2002). Avaliable at http://www.msri.org/publications/ln/msri/2002/quantumcrypto/shor/1/

[266] P. W. Shor, “Equivalence of Additivity Questions in Quantum Information Theory,” *Com. Math. Phys.* to apper; quant-ph/0305035 (2003).

[267] P. W. Shor, “Capacities of Quantum Channels and How to Find Them,” *Mathematical Programming*, **97** 311-335 (2003); quant-ph/0304102 (2003).

[268] P. W. Shor, and J. Preskill, “Simple proof of security of the BB84 quantum key distribution protocol,” *Phys. Rev. Lett.*, **85**, 441-444, (2000); quant-ph/0003004 (2000).

[269] R. Van Slyke and R. Wets, “A Duality Theory for Abstract Mathematical Programs with Applications to Optimal Control Theory,” *J. Math. Anal. Appl.*, **19**, (1967).

[270] A. M. Steane, *Proc. Roy. Soc. Lond. A* **452**, 2551 (1996); quant-ph/9601029.

[271] W. F. Stinespring, Proc. Am. Math. Soc. **6**, 211 (1955).

[272] R. L. Stratonovich, "Information Capacity of a Quantum Communications Channel . I, II." Izvestiya VUZ. Radiofizika, **8**, 116-141 (1965).

[273] R. L. Stratonovich, "The transmission rate for certain quantum communication channels," *Problemly Peredachi Informatsii*, **2**, 45-57, 1966. (In Russian) (English Translation: *Probl. Inform. Transm.*, **2**, 35-44, 196?.)

[274] R. L. Stratonovich, A. G. Vantsjan, "On asymptotically errorless decoding in pure quantum channels," *Probl. Control Inform. Theory*, **7**, 161-174 (1978).

[275] D. Stucki, N. Gisin, O. Guinnard, G. Ribordy and H. Zbinden, "Quantum key distribution over 67 km with a plug & play system," *New Journal of Physics*, **4** 41.1-41.8 (2002).

[276] 竹内啓 他編, 統計学辞典 (東洋経済, 1989).

[277] A. Uhlmann, "The 'transition probability' in the state space of *-algebra," *Rep. Math. Phys.*, **9**, 273-279, (1976).

[278] A. Uhlmann, "Relative entropy and the Wigner-Yanase-Dyson-Lieb concavity in an interpolation theory", *Com. Math. Phys.*, **54**, 21-32, (1977).

[279] A. Uhlmann, "Density operators as an arena for differential geometry," *Rep. Math. Phys.*, **33**, 253-263 (1993).

[280] K. Usami, Y. Nambu, Y. Tsuda, K. Matsumoto, and K. Nakamura, "Accuracy of quantum-state estimation utilizing Akaike's information criterion," *Phys. Rev. A*, **68**, 022314 (2003); quant-ph/0306083

[281] V. Vedral and M.B. Plenio, "Entanglement Measures and Purification Procedures," *Phys. Rev. A*, **57**, 822 (1998); quant-ph/9707035 (1997).

[282] S. Verdú and T. S. Han, "A general formula for channel capacity," *IEEE Trans. Inform. Theor.*, **40**, 1147-1157, 1994.

[283] G. Vidal, "Entanglement of pure states for a single copy," *Phys. Rev. Lett.*, **83** 1046-1049 (1999); quant-ph/9902033 (1999).

[284] X. Wang and H. Fan, "Non-post-selection entanglement concentration by ordinary linear optical devices," *Phys. Rev. A*, **68**, 060302(R), (2003); quant-ph/0302105

[285] R. S. Ward and R. O. Wells, Jr, *Twistor Geometry and Field Theory*, (Cambridge Press, 1991).

[286] R. F. Werner, "Optimal cloning of pure states," *Phys. Rev. A*, **58**, 1827 (1998).

[287] H. Weyl, *The classical groups, their invariants and representations,* (Princeton University Press, Princeton, NJ, 1939).

[288] A. Winter, "Coding theorem and strong converse for quantum channels," *IEEE Trans. Inform. Theor.*, **45**, 2481-2485 (1999);

[289] A. Winter, "Coding Theorems of Quantum Information Theory," Ph.D. dissertation, Uni Bielefeld (2000); quant-ph/9907077 (1999).

[290] A. Winter, "Scalable programmable quantum gates and a new aspect of the additivity

problem for the classical capacity of quantum channels," *J. Math. Phys.*, **43**, 4341-4352, (2002); quant-ph/0108066 (2001).

[291] A. D. Wyner, "The wire-tap channel," *Bell. Sys. Tech. Jour.*, **54**, 1355-1387, (1975).

[292] T. Yamamoto, M. Koashi, Ş. Özdemir, and N. Imoto, "Experimental extraction of an entangled photon pair from two idenically decohered pairs," *Nature*, **421**, 343-346 (2003).

[293] H. P. Yuen, R. S. Kennedy and M. Lax, "Optimum Testing of Multiple Hypotheses in Quantum Detection Theory," *IEEE Trans. Inform. Theor.* **21**, 125-134 (1975).

[294] H. P. Yuen and M. Lax, "Multiple-parameter quantum estimation and measurement of non-selfadjoint observables," *IEEE Trans. Inform. Theor.*, **19**, 740 (1973).

[295] F. Yura, "Entanglement cost of three-level antisymmetric states," *J. Phys. A: Math. and Gen.*, **36**, L237-L242 (2003); quant-ph/0302163.

追記: 上記の文献のうち，[60],[95],[111],[180],[193],[195],[196],[198],[203] は入手が困難と思われるが，これらについては下記の論文集に収録される予定である．([60],[111],[180] については一部のみ．日本語のものについてはその英訳を収録する．)

M. Hayashi, eds. *Asymptotic Theory in Quantum Statistical Inference: Selected Papers*, World Scientific (2004).

これらには，他に [33],[63],[64],[68],[71],[77],[96],[97],[98],[108],[123],[155],[176],[216] を収録する予定である．