Bibliography

[1]   S. Aaronson, Quantum lower bound for recursive Fourier sampling, *arXiv:quant-ph*/0209060.

[2]   S. Aaronson, Read the fine print, *Nature Physics*, 11(2015)291-293.

[3]   A. J. Abhari, A. Faruque, M. Dousti, L. Svec, O. Catu, A. Chakrabati, C.-F. Chiang, S. Vanderwilt, J. Black, F. Chong, M. Martonosi, M. Suchara, K. Brown, M. Pedram and T.Brun, *Scaffold: Quantum Programming Language*, Technical Report TR-934-12, Dept. of Computer Science, Princeton University, 2012.

[4]   S. Abramsky, High-Level Methods for Quantum Computation and Information. In: *Proceedings of the 19th Annual IEEE Symposium on Logic in Computer Science (LICS)*, 2004, IEEE Computer Society, 410–414, 2004.

[5]   S. Abramsky and B. Coecke, A categorical semantics of quantum protocols. In: *Proceedings of the 19th Annual IEEE Symposium on Logic in Computer Science (LICS)*, 2004, pp. 415-425.

[6]   S. Abramsky and R. Duncan, A categorical quantum logic, *Mathematical Structures in Computer Science*, 16(2006)469-489.

[7]   S. Abramsky, E. Haghverdi and P. Scott, Geometry of interaction and linear combinatory algebras, *Mathematical Structures in Computer Science*, 12(2002)625-665.

[8]   R. Adams, QPEL: Quantum program and effect language. In: *Proceedings of the 11th workshop on Quantum Physics and Logic (QPL)*, EPTCS 172, 2014, pp. 133-153.

[9]   D. Aharonov, A. Ambainis, J. Kempe and U. Vazirani, Quantum walks on graphs. In: *Proceedings of the 33rd ACM Symposium on Theory of Computing (STOC)*, 2001, pp. 50-59.

[10]   D. Aharonov, W. van Dam, J. Kempe, Z. Landau, S. Lloyd and O. Regev, Adiabatic quantum computation is equivalent to standard quantum computation. In: *Proceedings of the 45th Symposium on Foundations of Computer Science (FOCS),* 2004, pp. 42-51.

[11]   Y. Aharonov, J. Anandan, S. Popescu and L. Vaidman, Superpositions of time evolutions of a quantum system and quantum time-translation machine, *Physical Review Letters*, 64 (1990) 2965-2968.

[12]   Y. Aharonov, L. Davidovich and N. Zagury, Quantum random walks, *Physical Review A*, 48(1993), 1687-1690.

[13]   A. V. Aho, M. S. Lam, R. Sethi and J. D. Ullman, *Compilers: Principles, Techniques, and Tools* (second edition), Addison-Wesley, 2007.

[14]   T. Altenkirch and J. Grattage, A functional quantum programming language. In: *Proc. of the 20th Annual IEEE Symposium on Logic in Computer Science (LICS)*, 2005, pp. 249-258.

[15]   T. Altenkirch, J. Grattage, J. K. Vizzotto and A. Sabry, An algebra of pure quantum programming, *Electronic Notes in Theoretical Computer Science*, 170(2007)23-47.

[16]   T. Altenkirch and A. S. Green, The quantum IO monad. In: *Semantic Techniques in Quantum Computation* I. Mackie and S. Gay, eds., Cambridge University Press 2010, pp. 173-205.

[17]   A. Ambainis, Quantum walk algorithm for Element Distinctness, *SIAM Journal on Computing*, 37(2007)210-239.

[18]   A. Ambainis, Quantum walks and their algorithmic applications, *International Journal of Quantum Information*, 1(2004)507-518.

[19]   A. Ambainis, E. Bach, A. Nayak, A. Vishwanath and J. Watrous, One-dimensional quantum walks. In: *Proceedings of the 33rd ACM Symposium on Theory of Computing (STOC)*, 2001, pp. 37-49.

[20]   M. Amy, D. Maslov, M. Mosca and M. Rötteler, A meet-in-the-middle algorithm for fast synthesis of depth-optimal quantum circuits, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, 32(2013)818-830.

[21]   K. R. Apt, F. S. de Boer and E. -R. Olderog, *Verification of Sequential and Concurrent Programs*, Springer, London 2009.

[22]   M. Araújo, A. Feix, F. Costa and C. Brukner, Quantum circuits cannot control unknown operations, *New Journal of Physics*, 16(2004) art. no. 093026.

[23]   M. Araújo, F. Costa and C. Brukner, Computational advantage from quantum-controlled ordering of gates, *Physical Review Letters*, 113(2014) art. no. 250402.

[24]   E. Ardeshir-Larijani, S. J. Gay and R. Nagarajan, Equivalence checking of quantum protocols, *TACAS, 2013*, pp. 478-492.

[25]   E. Ardeshir-Larijani, S. J. Gay and R. Nagarajan, Verification of concurrent quantum protocols by equivalence checking. In: *Proceedings of the 20th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, 2014, pp. 500-514.

[26]   S. Attal, Fock spaces, http://math.univ-lyon1.fr/~attal/Mescours/fock.pdf.

[27]   R. -J. Back and J. von Wright, *Refinement Calculus: A Systematic Introduction*, Springer, New York, 1998.

[28]   C. Bǎdescu and P. Panangaden, Quantum alternation: prospects and problems. In: *Proceedings of the 12th International Workshop on Quantum Physics and Logic (QPL)*, 2015.

[29]   C. Baier and J. -P. Katoen, *Principles of Model Checking*, MIT Press, Cambridge, Massachusetts, 2008.

[30]   A. Baltag and S. Smets, LQP: the dynamic logic of quantum information, *Mathematical Structures in Computer Science*, 16(2006)491-525.

[31]   P. Baltazar, R. Chadha and P. Mateus, Quantum computation tree logic – model checking and complete calculus, *International Journal of Quantum Information*, 6(2008)219-236.

[32]   P. Baltazar, R. Chadha, P. Mateus and A. Sernadas, Towards model-checking quantum security protocols. In: P. Dini et al. (eds.), *Proceedings of the 1st Workshop on Quantum Security (QSec07)*, IEEE Press, 2007.

[33]   J. Bang-Jensen and G. Gutin, *Digraphs: Theory, Algorithms and Applications*, Springer, Berlin, 2007.

[34]   A. Barenco, C. H. Bennett, R. Cleve, D. P. DiVincenzo, N. Margolus, P. Shor, T. Sleator, J. A. Smolin and H. Weinfurter, Elementary gates for quantum computation, *Physical Review A*, 52(1995)3457-3467.

[35]   P. A. Benioff, The computer as a physical system: a microscopic quantum mechanical Hamiltonian model of computers as represented by Turing machines, *Journal of Statistical Physics*, 22(1980)563-591.

[36]   C. H. Bennett and G. Brassard, Quantum cryptography: public key distribution and coin tossing. In: *Proceedings of International Conference on Computers, Systems and Signal Processing*, 1984.

[37]   E. Bernstein and U. Vazirani, Quantum complexity theory. In: *Proc. of the 25th Annual ACM Symposium on Theory of Computing (STOC)*, 1993, pp. 11-20.

[38]   E. Bernstein and U. Vazirani, Quantum complexity theory, *SIAM Journal on Computing*, 26(1997)1411-1473.

[39]   S. Bettelli, T. Calarco and L. Serafini, Toward an architecture for quantum programming, *The European Physical Journal D*, 25(2003)181-200.

[40]   R. Bhatia, *Matrix Analysis*, Springer Verlag, Berlin, 1991.

[41]   R. Bird, *Programs and Machines: An Introduction to the Theory of Computation*, John Wiley & Sons, 1976.

[42]   G. Birkhoff and J. von Neumann, The logic of quantum mechanics, *Annals of Mathematics*, 37(1936)823-843.

[43]   R. F. Blute, P. Panangaden and R. A. G. Seely, Holomorphic models of exponential types in linear logic. In: *Proceedings of the 9th Conference on Mathematical Foundations of Programming Semantics (MFPS)*, Springer LNCS 802, 1994, pp. 474-512.

[44]   A. Bocharov, M. Rötteler and K. M. Svore, Efficient synthesis of universal Repeat-Until-Success circuits, *Physical Review Letters*, 114(2015) art. no. 080502.

[45]   A. Bocharov and K. M. Svore, Resource-optimal single-qubit quantum circuits, *Physical Review Letters*, 109(2012) art. no. 190501.

[46]   R. J. Boulton, R. Hardy and U. Martin, Hoare logic for single-input single-output continuous-time control systems. In: *Proceeding of the 6th International Workshop on Hybrid Systems: Computation and Control (HSCC 2003)*, Springer LNCS 2623, pp. 113-125.

[47]   H. -P. Breuer and F. Petruccione, *The Theory of Open Quantum Systems*, Oxford University Press, Oxford, 2002.

[48]   T. Brun, A simple model of quantum trajectories, *American Journal of Physics*, 70(2002)719-737.

[49]   T. A. Brun, H. A. Carteret and A. Ambainis, Quantum walks driven by many coins, *Physical Review A*, 67 (2003) art. no. 052317.

[50]   O. Brunet and P. Jorrand, Dynamic quantum logic for quantum programs, *International Journal of Quantum Information*, 2(2004)45-54.

[51]   H. Buhrman and H. Röhrig, Distributed quantum computing. In: *Proceedings of the 28th International Symposium on Mathematical Foundations of Computer Science (MFCS)*, 2003, Springer LNCS 2747, pp 1-20.

[52]   R. Chadha, P. Mateus and A. Sernadas, Reasoning about imperative quantum programs, *Electronic Notes in Theoretical Computer Science*, 158(2006)19-39.

[53]   A. M. Childs, R. Cleve, E. Deotto, E. Farhi, S. Gutmann and D. A. Spielman, Exponential algorithmic speedup by quantum walk. In: *Proceedings of the 35th ACM Symposium on Theory of Computing (STOC)*, 2003, pp. 59-68.

[54]   A. M. Childs, Universal computation by quantum walk, *Physical Review Letters*, 102(2009) art. no. 180501.

[55]   G. Chiribella, Perfect discrimination of no-signalling channels via quantum superposition of causal structures, *Physical Review A*, 86(2012) art. no. 040301.

[56]   G. Chiribella, G. M. D'Ariano, P. Perinotti and B. Valiron, Quantum computations without definite causal structure, *Physical Review A*, 88(2013), art. no. 022318.

[57]   K. Cho, Semantics for a quantum programming language by operator algebras. In: *Proceedings 11th workshop on Quantum Physics and Logic (QPL)*, EPTCS 172, 2014, pp. 165-190.

[58]   J.I. Cirac, A.K. Ekert, S.F. Huelga and C. Macchiavello, Distributed quantum computation over noisy channels, *Physical Review A*, 59(1999)4249-4254.

[59]   J. I. Cirac and P. Zoller, Goals and opportunities in quantum simulation, *Nature Physics*, 8(2012)264-266.

[60]   D. Copsey, M. Oskin, F. Impens, T. Metodiev, A. Cross, F. T. Chong, I. L. Chuang and J. Kubiatowicz, Toward a Scalable, Silicon-Based Quantum Computing Architecture (invited paper), *IEEE Journal of Selected Topics in Quantum Electronics*, 9(2003)1552-1569.

[61]   T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, *Introduction to Algorithms*, The MIT Press, 2009 (Third Edition).

[62]   M. Dalla Chiara, R. Giuntini and R. Greechie, *Reasoning in Quantum Theory: Sharp and Unsharp Quantum Logics*, Kluwer, Dordrecht, 2004.

[63]   V. Danos, E. Kashefi and P. Panangaden, The measurement calculus, *Journal of the ACM*, 54(2007)8.

[64]   V. Danos, E. Kashefi, P. Panangaden and S. Perdrix, Extended measurement calculus. In: *Semantic Techniques in Quantum Computation* I. Mackie and S. Gay, eds., Cambridge University Press 2010, pp. 235-310.

[65]   T. A. S. Davidson, *Formal Verification Techniques Using Quantum Process Calculus*, PhD Thesis, University of Warwick, 2012.

[66]   T. A. S. Davidson, S. J. Gay, H. Mlnarik, R. Nagarajan and N. Papanikolaou, Model checking for communicating quantum processes, *International Journal of Unconventional Computing*, 8(2012)73-98.

[67]   T. A. S. Davidson, S. J. Gay and R. Nagarajan, Formal analysis of quantum systems using process calculus, *Electronic Proceedings in Theoretical Computer Science 59 (ICE 2011)*, pp. 104-110.

[68]   T. A. S. Davidson, S. J. Gay, R. Nagarajan and I. V. Puthoor, Analysis of a quantum error correcting code using quantum process calculus, *Electronic Proceedings in Theoretical Computer Science* 95, pp. 67-80.

[69]   D. Deutsch, Quantum theory, the Church-Turing principle and the universal quantum computer, *Proceedings of The Royal Society of London* A400(1985)97-117.

[70]   E. D'Hondt and P. Panangaden, Quantum weakest preconditions. *Mathematical Structures in Computer Science*, 16(2006)429-451.

[71]   J. P. Dowling and G. J. Milburn, Quantum technology: the second quantum revolution, *Philosophical Transactions of the Royal Society London A*, 361(2003) 1655-1674.

[72]   Y. X. Deng and Y. Feng, Open bisimulation for quantum processes. In: *Proceedings of IFIP Theoretical Computer Science*, Springer Lecture Notes in Computer Science 7604, pp. 119-133.

[73]   D. Deutsch and R. Jozsa, Rapid solutions of problems by quantum computation, *Proceedings of the Royal Society of London A439* (1992) 553-558.

[74]   E. W. Dijkstra, Guarded commands, nondeterminacy and formal derivation of programs, *Communications of the ACM*, *18* (1975) 453-457.

[75]   E. W. Dijkstra, *A Discipline of Programming*, Prentice-Hall, 1976.

[76]   R. Y. Duan, S Severini and A Winter, Zero-error communication via quantum channels, noncommutative graphs, and a quantum Lovasz theta function, *IEEE Transactions on Information Theory*, 59 (2013)1164-1174.

[77]   J. Eisert, M. Wilkens and M. Lewenstein, Quantum games and quantum strategies, *Physical Review Letters*, 83(1999)3077-3080.

[78]   J. Esparza and S. Schwoon, A BDD-based model checker for recursive programs. In: *Proceedings of the 13th International Conference on Computer Aided Verification (CAV),* 2001, Springer LNCS 2102, pp. 324-336.

[79]   K. Etessami and M. Yannakakis, Recursive Markov chains, stochastic grammars, and monotone systems of nonlinear equations, *Journal of the ACM*, 56(2009) art. no. 1.

[80]   E. Farhi, J. Goldstone, S. Gutmann, and M. Sipser, Quantum computation by adiabatic evolution, *arXiv: quant-ph/0001106*.

[81]   Y. Feng, Y. X. Deng and M. S. Ying, Symbolic bisimulation for quantum processes, *ACM Transactions on Computational Logic*, 15(2014) art. no. 14.

[82]   Y. Feng, R. Y. Duan, Z. F. Ji and M. S. Ying, Proof rules for the correctness of quantum programs, *Theoretical Computer Science*, *386* (2007), 151-166.

[83]   Y. Feng, R. Y. Duan, Z. F. Ji and M. S. Ying, Probabilistic bisimulations for quantum processes, *Information and Computation*, 205(2007)1608-1639.

[84]   Y. Feng, R. Y. Duan and M. S. Ying, Bisimulation for quantum processes. In: *Proceedings of the 38th ACM Symposium on Principles of Programming Languages (POPL)*, 2011, pp. 523-534.

[85]   Y. Feng, R. Y. Duan and M. S. Ying, Bisimulation for quantum processes, *ACM Transactions on Programming Languages and Systems*, 34(2012) art. no: 17.

[86]   Y. Feng, E. M. Hahn, A. Turrini and L. J. Zhang, QPMC: a model checker for quantum programs and protocols. In: *Proceedings of the 20th International Symposium on Formal Methods (FM 2015)*, Springer LNCS 9109, pp. 265-272.

[87]   Y. Feng, N. K. Yu and M. S. Ying, Reachability analysis of recursive quantum Markov chains. In: *Proceedings of the 38th International Symposium on Mathematical Foundations of Computer Science (MFCS)*, 2013, pp. 385-396.

[88]   Y. Feng, N. K. Yu and M. S. Ying, Model checking quantum Markov chains, *Journal of Computer and System Sciences*, 79(2013)1181-1198.

[89]   S. Franke-Arnold, S. J. Gay and I. V. Puthoor, Quantum process calculus for linear optical quantum computing. In: *Proceedings of the 5th International Conference on Reversible Computation (RC)*, 2013, Proceedings. Lecture Notes in Computer Science 7948, Springer, pp. 234-246.

[90]   S. Franke-Arnold, S. J. Gay and I. V. Puthoor, Verification of linear optical quantum computing using quantum process calculus, *Electronic Proceedings in Theoretical Computer Science 160 (EXPRESS/SOS 2014)*, pp. 111-129.

[91]   N. Friis, V. Dunjko, W. Dür and H. J. Briegel, Implementing quantum control for unknown subroutines, *Physical Review A*, 89 (2014), art. no. 030303.

[92]   S. J. Gay, Quantum programming languages: survey and bibliography, *Mathematical Structures in Computer Science* 16(2006)581-600.

[93]   S. J. Gay and R. Nagarajan, Communicating Quantum Processes. In: *Proceedings of the 32nd ACM Symposium on Principles of Programming Languages (POPL)*, 2005, pp. 145-157.

[94]   S. J. Gay and R. Nagarajan, Types and typechecking for communicating quantum processes, *Mathematical Structures in Computer Science*, 16(2006)375-406.

[95]   S. J. Gay, R. Nagarajan and N. Papanikolaou, Probabilistic model-checking of quantum protocols. In: *Proceedings of the 2nd International Workshop on Developments in Computational Models (DCMÕ06)*, 2006.

[96]   S. J. Gay, R. Nagarajan and N. Papanikolaou, Specification and verification of quantum protocols, *Semantic Techniques in Quantum Computation* (S. J. Gay and I. Mackie, eds.), Cambridge University Press, 2010, pp. 414-472.

[97]   S. J. Gay, N. Papanikolaou and R. Nagarajan, QMC: a model checker for quantum systems. In: *Proceedings of the 20th International Conference on Computer Aided Verification (CAV)*, 2008, Springer LNCS 5123, pp. 543-547.

[98]   S. J. Gay and I. V. Puthoor, Application of quantum process calculus to higher dimensional quantum protocols, *Electronic Proceedings in Theoretical Computer Science 158 (QPL 2014)*, pp. 15-28.

[99]   B. Giles and P. Selinger, Exact synthesis of multiqubit Clifford+T circuits, *Physical Review A*, 87(2013), art. no. 032332.

[100]   V. Giovannetti, S. Lloyd and L. Maccone, Quantum-enhanced positioning and clock synchronisation, *Nature*, 412(2001)417-419.

[101]   J.-Y. Girard, Geometry of interaction I: Interpretation of system F. In: *Logic Colloquium 88*, North Holland, 1989, pp. 221-260.

[102]   A. M. Gleason, Measures on the closed subspaces of a Hilbert space, *Journal of Mathematics and Mechanics*, 6(1957)885-893.

[103]   M. Golovkins, Quantum pushdown automata. In: *Proceedings of the 27th Conference on Current Trends in Theory and Practice of Informatics (SOFSEM),* 2000, Springer LNCS 1963, pp. 336-346.

[104]   D. Gottesman and I. Chuang, Quantum teleportation as a universal computational primitive, *Nature*, 402(1999)390-393.

[105]   J. Grattage, An overview of QML with a concrete implementation in Haskell, *Electronic Notes in Theoretical Computer Science*, 270(2011)165-174.

[106]   A. S. Green, P. L. Lumsdaine, N. J. Ross, P. Selinger and B. Valiron, Quipper: A scalable quantum programming language. In: *Proceedings of the 34th ACM Conference on Programming Language Design and Implementation (PLDI)*, 2013, pp. 333-342.

[107]   A. S. Green, P. L. Lumsdaine, N. J. Ross, P. Selinger and B. Valiron, An introduction to quantum programming in Quipper, *arXiv: 1304.5485*.

[108]   R. B. Griffiths, Consistent histories and quantum reasoning, *Physical Review A*, 54(1996)2759-2774.

[109]   L. K. Grover, Fixed-point quantum search, *Physical Review Letters*, *95* (2005), art. no. 150501.

[110]   S. Gudder, Lattice properties of quantum effects, *Journal of Mathematical Physics*, 37(1996)2637-2642.

[111]   S. Gudder, Quantum Markov chains, *Journal of Mathematical Physics*, 49(2008), art. no. 072105.

[112]   A. W. Harrow, A. Hassidim and S. Lloyd, Quantum algorithm for linear systems of equations, *Physical Review Letters*, *103* (2009) art. no. 150502.

[113]   S. Hart, M. Sharir and A. Pnueli, Termination of probabilistic concurrent programs, *ACM Transactions on Programming Languages and Systems*, 5(1983)356-380.

[114]   J. D. Hartog and E. P. de Vink, Verifying probabilistic programs using a Hoare like logic, *International Journal of Foundations of Computer Science*, 13 (2003)315-340.

[115]   I. Hasuo and N. Hoshino, Semantics of higher-order quantum computation via Geometry of Interaction. In: *Proceedings of the 26th Annual IEEE Symposium on Logic in Computer Science (LICS)*, 2011, pp. 237-246.

[116]   B. Hayes, Programming your quantum computer, *American Scientist*, 102(2014) 22-25.

[117]   C. Heunen and B. Jacobs, Quantum logic in dagger kernel categories. In: *Proceedings of Quantum Physics and Logic 2009*.

[118]   K. Honda, Analysis of quantum entanglement in quantum programs using stabiliser formalism. In: *Proceedings of the 12th International Workshop on Quantum Physics and Logic (QPL)*, 2015. arXiv:1511.01181.

[119]   C. A. R. Hoare, Procedures and parameters: an axiomatic approach. In: *Symposium on Semantics of Algorithmic Languages*, Springer Lecture Notes in Mathematics 188, 1971, pp 102-116.

[120] T. Hoare and R. Milner (eds.), *Grand Challenges in Computing Research* (organised by BCS, CPHC, EPSRC, IEE, etc.), 2004, http://www.ukcrc.org.uk/grand-challenges/index.cfm.

[121] P. Hoyer, J. Neerbek and Y. Shi, Quantum complexities of ordered searching, sorting and element distinctness. In: *Proceedings of the 28th International Colloquium on Automata, Languages, and Programming (ICALP)*, 2001, pp. 62-73.

[122] N. Inui, N. Konno and E. Segawa, One-dimensional three-state quantum walk, *Physical Review E*, 72 (2005) art. no. 056112.

[123] B. Jacobs, On block structures in quantum computation, *Electronic Notes in Theoretical Computer Science*, 298(2013)233-255.

[124] B. Jacobs, New directions in categorical logic, for classical, probabilistic and quantum Logic, *Logical Methods in Computer Science*, 2015.

[125] C. J. Isham and N. Linden, Quantum temporal logic and decoherence functionals in the histories approach to generalized quantum theory, *Journal of Mathematical Physics*, 35(1994)5452-

[126] A. JavadiAbhari, S. Patil, D. Kudrow, J. Heckey, A. Lvov, F. T. Chong and M. Martonosi, ScaffCC: Scalable compilation and analysis of quantum programs, *Parallel Computing*, 45(2015)2-17.

[127] N. D. Jones, *Computability and Complexity: From a Programming Perspective*, The MIT Press, 1997.

[128] P. Jorrand and M. Lalire, Toward a quantum process algebra. In: *Proceedings of the 1st ACM Conference on Computing Frontier*, 2004, pp. 111-119.

[129] P. Jorrand and S. Perdrix, Abstract interpretation techniques for quantum computation. In: *Semantic Techniques in Quantum Computation* I. Mackie and S. Gay, eds., Cambridge University Press 2010, pp. 206-234.

[130] R. Jozsa and N. Linden, On the role of entanglement in quantum computational speed-up, *Proceedings of the Royal Society of London, Series A Mathematical, Physical and Engineering Sciences*, 459 (2003)2011-2032.

[131] R. Kadison, Order properties of bounded self-adjoint operators, *Proceedings of American Mathematical Society*, 34(1951)505-510.

[132] Y. Kakutani, A logic for formal verification of quantum programs. In: *Proceedings of the 13th Asian Computing Science Conference (ASIAN),* 2009, Springer LNCS 5913, pp. 79-93.

[133] E. Kashefi, Quantum domain theory – Definitions and applications, *arXiv:quant-ph*/0306077.

[134] A. Kitaev, Fault-tolerant quantum computation by anyons, *ArXiv: quantph/9707021*.

[135] A. Kitaev, A. H. Shen and M. N. Vyalyi, *Classical and Quantum Computation*, American Mathematical Society, Providence 2002.

[136] T. Kadowaki and H. Nishimori, Quantum annealing in the transverse Ising model, *Physical Review E*, 58(1998)5355.

[137] V. Kliuchnikov, D. Maslov and M. Mosca, Fast and efficient exact synthesis of single qubit unitaries generated by Clifford and T gates, *Quantum Information & Computation*, 13(2013)607-630.

[138] V. Kliuchnikov, A. Bocharov and K. M. Svore, Asymptotically optimal topological quantum compiling, *Physical Review Letters*, 112(2014) art. no. 140504.

[139] E.H. Knill, *Conventions for Quantum Pseudo-code*, Technical Report, Los Alamos National Laboratory, 1996.

[140]   A. Kondacs and J. Watrous, On the power of quantum finite state automata. In: *Proc. 38th Symposium on Foundation of Computer Science*, 1997, pp. 66-75.

[141]   T. Kubota, *Verification of Quantum Cryptographic Protocols using Quantum Process Algebras*, PhD Thesis, Department of Computer Science, University of Tokyo, 2014.

[142]   T. Kubota, Y. Kakutani, G. Kato, Y. Kawano and H. Sakurada, Application of a process calculus to security proofs of quantum protocols. In: *Proceedings of Foundations of Computer Science in WORLDCOMP*, 2012, pp. 141-147.

[143]   T. Kubota, Y. Kakutani, G. Kato, Y. Kawano and H. Sakurada, Semi-automated verification of security proofs of quantum cryptographic protocols, *Journal of Symbolic Computation*, 2015.

[144]   D. Kudrow, K. Bier, Z. Deng, D. Franklin, Y. Tomita, K. R. Brown and F. T. Chong, Quantum rotation: A case study in static and dynamic machine-code generation for quantum computer. In: *Proceedings of the 40th ACM/IEEE International Symposium on Computer Architecture (ISCA)*, 2013, pp. 166-176.

[145]   P. Kurzyński and A. Wójcik, Quantum walk as a generalized measure device, *Physical Review Letters*, *110* (2013) art. no. 200404.

[146]   M. Kwiatkowska, G. Norman and P. Parker, Probabilistic symbolic model-checking with PRISM: a hybrid approach, *International Journal on Software Tools for Technology Transfer*, 6(2004)128-142.

[147]   M. Lalire, Relations among quantum processes: bisimilarity and congruence, *Mathematical Structures in Computer Science*, 16(2006)407-428.

[148]   M. Lampis, K. G. Ginis, M. A. Papakyriakou and N. S. Papaspyrou, Quantum data and control made easier, *Electronic Notes in Theoretical Computer Science* 210(2008) 85-105.

[149]   A. Lapets and M. Rötteler, Abstract resource cost derivation for logical quantum circuit description. In: *Proceedings of the ACM Workshop on Functional Programming Concepts in Domain-Specific Languages (FPCDSL)*, 2013, pp. 35-42.

[150]   A. Lapets, M. P. da Silva, M. Thome, A. Adler, J. Beal and M. Rötteler, QuaFL: A typed DSL for quantum programming. In: *Proceedings of the ACM Workshop on Functional Programming Concepts in Domain-Specific Languages (FPCDSL)*, 2013, pp. 19-27.

[151]   D. W. Leung, Quantum computation by measurements, *International Journal of Quantum Information*, 2(2004)33-43.

[152]   Y. J. Li, N. K. Yu and M. S. Ying, Termination of nondeterministic quantum programs, *Acta Informatica*, 51(2014)1-24.

[153]   Y. J. Li and M. S. Ying, (Un)decidable problems about reachability of quantum systems. In: *Proceedings of the 25th International Conference on Concurrency Theory (CONCUR)*, 2014, pp. 482-496.

[154]   S. Lloyd, Universal quantum simulators, *Science*, 273(1996)1073-1078.

[155]   S. Lloyd, A theory of quantum gravity based on quantum computation, *arXiv:quant-ph/0501135*.

[156]   S. Lloyd, M. Mohseni and P. Rebentrost, Quantum principal component analysis, *Nature Physics*, 10(2014)631-633.

[157]   S. Lloyd, M. Mohseni and P. Rebentrost, Quantum algorithms for supervised and unsupervised machine learning, *arXiv:1307.0411v2*.

[158]   J. Loeckx and K. Sieber, *The Foundations of Program Verification* (second edition), John Wiley & Sons, Chichester, 1987.

[159]   N. B. Lovett, S. Cooper, M. Everitt, M. Trevers and V. Kendon, Universal quantum computation using the discrete-time quantum walk, *Physicl Review A*, *81* (2010) art. no. 042330.

[160]   I. Mackie and S. Gay (eds.), *Semantic Techniques in Quantum Computation*, Cambridge University Press, 2010.

[161]   F. Magniez, M. Santha and M. Szegedy, Quantum algorithms for the triangle problem, *SIAM Journal of Computing*, 37(2007)413-427.

[162]   Z. Manna, *Mathematical Theory of Computation*, McGraw-Hill, 1974.

[163]   Ph. A. Martin and F. Rothen, *Many-Body Problems and Quantum Field Theory: An Introduction*, Springer, Berlin, 2004.

[164]   P. Mateus, J. Ramos, A. Sernadas and C. Sernadas, Temporal logics for reasoning about quantum systems. In: *Semantic Techniques in Quantum Computation* I. Mackie and S. Gay, eds., Cambridge University Press 2010, pp. 389-413.

[165]   P. Maymin, Extending the lambda calculus to express randomized and quantumized algorithms, *arXiv:quant-ph/9612052*.

[166]   A. McIver and C. Morgan, *Abstraction, Refinement and Proof for Probabilistic Systems*, Springer, New York, 2005.

[167]   T. S. Metodi and F. T. Chong, Quantum Computing for Computer Architects, Synthesis Lectures in Computer Architecture # 1, Morgan & Claypool Publishers, 2011 (Second Edition).

[168]   D. A. Meyer, Quantum strategies, *Physical Review Letters*, 82 (1999)1052-1055.

[169]   J. A. Miszczak, Models of quantum computation and quantum programming languages, *Bulletion of the Polish Academy of Science: Technical Sciences*, 59(2011) 305-324.

[170]   J. A. Miszczak, *High-level Structures for Quantum Computing*, Morgan & Claypool Publishers, 2012.

[171]   M. Montero, Unidirectional quantum walks: Evolution and exit times, *Physical Review A*, 88 (2013) art. no. 012333.

[172]   C. Morgan, *Programming from Specifications*, Prentice Hall, Hertfordshire, 1988.

[173]   S. -C. Mu and R. Bird, Functional quantum programming. In: *Proceedings of the 2nd Asian Workshop on Programming Languages and Systems (APLAS),* 2001, pp. 75-88.

[174]   M. A. Nielsen and I. L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press, 2000.

[175]   M. A. Nielsen, Quantum computation by measurement and quantum memory, *Physical Letters A*, 308(2003)96-100.

[176]   R. Nagarajan, N. Papanikolaou and D. Williams, Simulating and compiling code for the Sequential Quantum Random Access Machine, *Electronic Notes in Theoretical Computer Science*, 170(2007)101-124.

[177]   B. Ömer, *Structured Quantum Programming*, Ph.D thesis, Technical University of Vienna, 2003.

[178]   M. Pagani, P. Selinger and B. Valiron, Applying quantitative semantics to higher-order quantum computing. In: *Proceedings of the 41st ACM Symposium on Principles of Programming Languages (POPL)*, 2014, pp. 647-658.

[179]   N. K. Papanikolaou, *Model Checking Quantum Protocols*, PhD Thesis, Department of Computer Science, University of Warwick, 2008.

[180]   A. Platzer, Differential dynamic logic for hybrid systems, *Journal of Automated Reasoning*, 41(2008)143-189, 2008.

[181] L. M. Procopio, A. Moqanaki, M. Araújo, F. Costa, I. A. Calafell, E. G. Dowd, D. R. Hamel, L. A. Rozema, C. Brukner and P. Walther, Experimental superposition of orders of quantum gates, *Nature Communications*, 2015, Art. no. 7913.

[182] E. Prugovečki, *Quantum Mechanics in Hilbert Space*, Academic Press, New York, 1981.

[183] R. Raussendorf and H. J. Briegel, A one-way quantum computer, *Physical Review Letters*, 86(2001)5188-5191.

[184] P. Rebentrost, M. Mohseni and S. Lloyd, Quantum support vector machine for big data classification, *Physical Review Letters*, 113(2014) art. no. 130501.

[185] M. Rennela, Towards a quantum domain theory: order-enrichment and fixpoints in W*-algebras. In: *Proceedings of the 30th Conference on the Mathematical Foundations of Programming Semantics (MFPS)*, 2014.

[186] T. Reps, S. Horwitz and M. Sagiv, Precise interprocedural dataflow analysis via graph reachability. In: *Proceedings of the 22nd ACM Symposium on Principles of Programming Languages (POPL)*, 1995, pp. 49-61.

[187] E. G. Rieffel, D. Venturelli, B. O'Gorman, M. B. Do, E. M. Prystay and V. N. Smelyanskiy, A case study in programming a quantum annealer for hard operational planning problems, *Quantum Information Processing*, 14(2015)1-36.

[188] N. J. Ross and P. Selinger, Optimal ancilla-free Clifford+T approximation of z-rotations, *arXiv:1403.2975*

[189] Y. Rouselakis, N. S. Papaspyrou, Y. Tsiouris and E. N. Todoran, Compilation to quantum circuits for a language with quantum data and control. In: *Proceedings of the 2013 Federated Conference on Computer Science and Information Systems (FedCSIS)* 2013, pp. 1537-1544.

[190] R. Rüdiger, Quantum programming languages: an introductory overview, *The Computer Journal*, 50(2007)134-150.

[191] J. W. Sanders and P. Zuliani, Quantum programming. In: *Proceedings of 5th International Conference on Mathematics of Program Construction (MPC)*, Springer LNCS 1837, Springer 2000, pp. 88-99.

[192] M. Santha, Quantum walk based search algorithms. In: *Proceedings of the 5th International Conference on Theory and Applications of Models of Computation (TAMC 2008)*, Springer LNCS 4978, pp 31-46.

[193] F. Schwabl, *Advanced Quantum Mechanics* (Fourth edition), Springer, 2008.

[194] P. Selinger, Towards a quantum programming language, *Mathematical Structures in Computer Science 14* (2004), 527-586.

[195] P. Selinger, A brief survey of quantum programming languages. In: *Proceedings of the 7th International Symposium on Functional and Logic Programming*, LNCS 2998, Springer, 2004, pp. 1-6.

[196] P. Selinger, Toward a semantics for higher-order quantum computation. In: *Proceedings of QPL'2004*, TUCS General Publications No. 33, pp. 127-143.

[197] P. Selinger and B. Valiron, A lambda calculus for quantum computation with classical control, *Mathematical Structures in Computer Science*, 16(2006)527-55.

[198] P. Selinger and B. Valiron, On a fully abstract model for a quantum linear functional language, *Electronic Notes in Theoretical Computer Science* 210(2008) 123-137.

[199] P. Selinger and B. Valiron, Quantum lambda calculus, in: S. Gay and I. Mackie (eds.), *Semantic Techniques in Quantum Computation*, Cambridge University Press 2010, pp. 135-172.

[200]   R. Sethi, *Programming Languages: Concepts and Constructs*, Addison-Wesley (2002).

[201]   V. V. Shende, S. S. Bullock and I. L. Markov, Synthesis of quantum-logic circuits, *IEEE Transactions on CAD of Integrated Circuits and Systems* 25(2006) 1000-1010.

[202]   M. Sharir, A. Pnueli and S. Hart, Verification of probabilistic programs, *SIAM Journal of Computing*, 13 (1984)292-314.

[203]   N. Shenvi, J. Kempe and K. B. Whaley, Quantum random-walk search algorithm, *Physical Review A*, 67(2003) art. no. 052307.

[204]   P. W. Shor, Algorithms for quantum computation: discrete logarithms and factoring. In: *Proceedings of the 35th IEEE Annual Symposium on Foundations of Computer Science (FOCS)*, 1994, 124-134.

[205]   P. W. Shor, Why haven't more quantum algorithms been discovered? *Journal of the ACM*, 50(2003)87-90.

[206]   S. Staton, Algebraic effects, linearity, and quantum programming languages. In: *Proceedings of the 42nd ACM Symposium on Principles of Programming Languages (POPL)*, 2015, pp. 395-406.

[207]   K. M. Svore, A. V. Aho, A. W. Cross, I. L. Chuang and I. L. Markov, A layered software architecture for quantum computing design tools, *IEEE Computer*, 39(2006) 74-83.

[208]   A. Tafliovich and E. C. R. Hehner, Quantum predicative programming. In: *Proceedings of the 8th International Conference on Mathematics of Program Construction (MPC)*, LNCS 4014, Springer, pp. 433-454.

[209]   A.Tafliovich and E.C.R.Hehner, Programming with quantum communication, *Electronic Notes in Theoretical Computer Science*, 253(2009)99-118.

[210]   G. Takeuti, Quantum set theory, in: E. Beltrametti and B. C. van Fraassen (eds.), *Current Issues in Quantum Logics*, Plenum, New Rork, 1981, pp. 303-322.

[211]   G. 't Hooft, The cellular automaton interpretation of quantum mechanics – A view on the quantum nature of our universe, compulsory or impossible?, *arXiv:1405.1548v2*.

[212]   A. van Tonder, A lambda calculus for quantum computation, *SIAM Journal on Computing*, 33(2004)1109-1135.

[213]   V. S. Varadarajan, *Geometry of Quantum Theory*, Springer-Verlag, New York, 1985.

[214]   S. E. Venegas-Andraca, Quantum walks: a comprehensive review, *Quantum Information Processing*, 11(2012)1015-1106.

[215]   D. Wecker and K. M. Svore, LIQUi|>: A software design architecture and domain-specific language for quantum computing, http://research.microsoft.com/pubs/209634/1402.4467.pdf.

[216]   M. M. Wolf, *Quantum Channels and Operators: Guided Tour*, unpublished lecture notes (2012).

[217]   P. Xue and B. C. Sanders, Two quantum walkers sharing coins, *Physical Review A*, 85 (2011) art. no. 022307.

[218]   A. C. Yao, Quantum circuit complexity. In: *Proceedings of the 34th Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, 1993, pp. 352-361.

[219]   K. Yasuda, T. Kubota and Y. Kakutani, Observational equivalence using schedulers for quantum processes, *Electronic Proceedings in Theoretical Computer Science 172 (QPL 2014)*, pp. 191-203.

[220]   M. S. Ying, Reasoning about probabilistic sequential programs in a probabilistic logic, *Acta Informatica*, 39(2003) 315-389.

[221] M. S. Ying, Floyd-Hoare logic for quantum programs, *ACM Transactions on Programming Languages and Systems*, *39* (2011), art. no. 19.

[222] M. S. Ying, Quantum recursion and second quantisation, (2014) arXiv:1405.4443.

[223] M. S. Ying, Foundations of quantum programming. In: Kazunori Ueda (Ed.), *Proc. of the 8th Asian Symposium on Programming Languages and Systems (APLAS 2010)*, Lecture Notes in Computer Science 6461, Springer 2010, pp. 16-20.

[224] M. S. Ying, J. X. Chen, Y. Feng and R. Y. Duan, Commutativity of quantum weakest preconditions, *Information Processing Letters*, 104(2007)152-158.

[225] M. S. Ying, R. Y. Duan, Y. Feng and Z. F. Ji, Predicate transformer semantics of quantum programs. In: *Semantic Techniques in Quantum Computation*, I. Mackie and S. Gay, eds., Cambridge University Press 2010, 311-360.

[226] M. S. Ying and Y. Feng, An algebraic language for distributed quantum computing, *IEEE Transactions on Computers* 58(2009)728-743.

[227] M. S. Ying and Y. Feng, Quantum loop programs, *Acta Informatica*, *47* (2010), 221-250.

[228] M. S. Ying and Y. Feng, A flowchart language for quantum programming, *IEEE Transactions on Software Engineering*, 37(2011)466-485.

[229] M. S. Ying, Y. Feng, R. Y. Duan and Z. F. Ji, An algebra of quantum processes, *ACM Transactions on Computational Logic*, 10(2009), art. no. 19.

[230] M. S. Ying, Y. Feng and N. K. Yu, Quantum information-flow security: Noninterference and access control. In: *Proceedings of the IEEE 26th Computer Security Foundations Symposium (CSF'2013)*, pp. 130-144.

[231] M. S. Ying, Y. J. Li, N. K. Yu and Y. Feng, Model-checking linear-time properties of quantum systems, *ACM Transactions on Computational Logic*, 15(2014), art. no. 22.

[232] M. S. Ying, N. K. Yu and Y. Feng, Defining quantum control flows of programs, *arXiv:1209.4379*.

[233] M. S. Ying, N. K. Yu and Y. Feng, Alternation in quantum programming: from superposition of data to superposition of programs, *arXiv: 1402.5172*. http://xxx.lanl.gov/abs/1402.5172.

[234] M. S. Ying, N. K. Yu, Y. Feng and R. Y. Duan, Verification of quantum programs, *Science of Computer Programming*, 78(2013)1679-1700.

[235] S. G. Ying, Y. Feng, N. K. Yu and M. S. Ying, Reachability analysis of quantum Markov chains. In: *Proceedings of the 24th International Conference on Concurrency Theory (CONCUR)*, 2013, pp. 334-348.

[236] S. G. Ying and M. S. Ying, Reachability analysis of quantum Markov decision processes, *arXiv:1406.6146*.

[237] N. K. Yu, R. Y. Duan and M. S. Ying, Five two-qubit gates are necessary for implementing Toffoli gate, *Physical Review A*, 88(2013) art. no. 010304.

[238] N. K. Yu and M. S. Ying, Reachability and termination analysis of concurrent quantum programs. In: *Proceedings of the 23th International Conference on Concurrency Theory (CONCUR)*, 2012, pp. 69-83.

[239] N. K. Yu and M. S. Ying, Optimal simulation of Deutsch gates and the Fredkin gate, *Physical Review A*, 91(2015) art. no. 032302.

[240] X. Q. Zhou, T. C. Ralph, P. Kalasuwan, M. Zhang, A. Peruzzo, B. P. Lanyon and J. L. O'Brien, Adding control to arbitrary unknown quantum operations, *Nature Communications*, *2* (2011) 413.1-8.

[241]   P. Zuliani, *Quantum Programming*, D.Phil. Thesis, University of Oxford, 2001.

[242]   P. Zuliani, Compiling quantum programs, *Acta Informatica*, 41(2005)435-473.

[243]   P. Zuliani, Quantum programming with mixed states. In: *Proceedings of the 3rd International Workshop on Quantum Programming Languages*, 2005.

[244]   P. Zuliani, Reasoning about faulty quantum programs, *Acta Informatica*, 46(2009) 403-432.