

Tsuyoshi Ito (伊藤剛志), Family name: Ito (伊藤), Given name: Tsuyoshi (剛志)

Mailing address:

Institute for Quantum Computing

200 University Ave. W.

Waterloo, ON N2L 3G1

Canada

Phone: +1-519-888-4567 Ext. 38074

Email: tsuyoshi@iqc.ca

WWW: <http://www.cs.uwaterloo.ca/~tito/>

Born: June 21, 1979, Citizenship: Japanese, Languages: Japanese, English

Fields of interest: Computational complexity and quantum nonlocality, especially interactive proof systems in the quantum world and the combinatorial structure of Bell inequalities.

Education

- Ph.D. (Information Science and Technology), Department of Computer Science, Graduate School of Information Science and Technology, the University of Tokyo, March 2007.
Thesis title: “Bell inequalities and the cut polytope: Bridging quantum information science and combinatorial optimization.”
Supervisor: Hiroshi Imai.
- Master (Information Science and Technology), Department of Computer Science, Graduate School of Information Science and Technology, the University of Tokyo, March 2004.
Thesis title: “Analyses of flow time and fairness of TCP congestion control algorithms in wide area networks.”
Supervisor: Hiroshi Imai.
- Bachelor (Science), Department of Information Science, Faculty of Science, the University of Tokyo, March 2002.
Thesis title: “Reformalization and implementation of fully dynamic algorithm for transitive closure on directed graphs.”
Supervisor: Hiroshi Imai.

Career

- Postdoctoral Fellow (supervisors: Debbie Leung (May 2011–present) and John Watrous (May 2009–present)), Institute for Quantum Computing and David R. Cheriton School of Computer Science, University of Waterloo (May 2009–present)
- Postdoctoral Fellow (supervisor: David Avis), School of Computer Science, McGill University (March 2008–March 2009)

- Project Researcher (supervisor: Keiji Matsumoto), Quantum Information Science Group, Principles of Informatics Research Division, National Institute of Informatics, Japan (April 2007–March 2008)
- Adjunct Member, Japan Delegation for the International Olympiad in Informatics (2006–2007 and 2010)
- Research Fellowships, Japan Society for the Promotion of Science (May 2005–March 2007)
- Teaching Assistant, Department of Information Science, Faculty of Science, the University of Tokyo (Jan. 2004–March 2004)
- Part-timer [system administration of network and UNIX PCs], ERATO Quantum Computation and Information Project, Japan Science and Technology Agency (Dec. 2001–2004)

Publication list

- [1] Quantum interactive proofs with weak error bounds.
Tsuyoshi Ito, Hirotada Kobayashi and John Watrous.
Available as arXiv:1012.4427 [quant-ph], Dec. 2010.
An oral presentation (contributed talk) at the *14th Workshop on Quantum Information Processing (QIP 2011)*, Singapore, Jan. 10–14, 2011.
- [2] Quantum fingerprints that keep secrets.
Dmitry Gavinsky and Tsuyoshi Ito.
Available as arXiv:1010.5342 [quant-ph], Oct. 2010.
Also available as *Electronic Colloquium on Computational Complexity*, Technical Report TR10-165, Nov. 2010.
- [3] Polynomial-space approximation of no-signaling provers.
Tsuyoshi Ito.
In *Automata, Languages and Programming: Proceedings of the 37th International Colloquium on Automata, Languages and Programming (ICALP 2010)*, pp. 140–151, Bordeaux, France, July 5–10, 2010. Volume 6198 of *Lecture Notes in Computer Science*. An oral presentation.
A preliminary version: arXiv:0908.2363 [cs.CC], Aug. 2009. Revised to v2, Oct. 2009.
A poster presentation at the *13th Workshop on Quantum Information Processing (QIP 2010)*, Zurich, Switzerland, Jan. 18–22, 2010.
- [4] Algorithmic folding complexity.
Jean Cardinal, Erik D. Demaine, Martin L. Demaine, Shinji Imahori, Tsuyoshi Ito, Masashi Kiyomi, Stefan Langerman, Ryuhei Uehara and Takeaki Uno.
Graphs and Combinatorics, 27(3):341–351, May 2011. Special issue for the Japan Conference on Computational Geometry and Graphs (JCCGG2009).

- [5] Oracularization and two-prover one-round interactive proofs against nonlocal strategies.
Tsuyoshi Ito, Hirotada Kobayashi and Keiji Matsumoto.
In *Proceedings: 24th Annual IEEE Conference on Computational Complexity (CCC 2009)*, pp. 217–228, Paris, France, July 15–18, 2009. An oral presentation.
A preliminary version: arXiv:0810.0693 [quant-ph], Oct. 2008.
Also presented at the *12th Workshop on Quantum Information Processing (QIP 2009)* as oral presentation, Santa Fe, New Mexico, USA, Jan. 12–16, 2009.
- [6] Complexity of pleats folding.
Tsuyoshi Ito, Masashi Kiyomi, Shinji Imahori and Ryuhei Uehara.
In *Proceedings of the 25th European Workshop on Computational Geometry (EuroCG 2009)*, pp. 53–56, Brussels, Belgium, Mar. 16–18, 2009.
- [7] Generalized Tsirelson inequalities, commuting-operator provers, and multi-prover interactive proof systems.
Tsuyoshi Ito, Hirotada Kobayashi, Daniel Preda, Xiaoming Sun and Andrew C.-C. Yao.
In *Proceedings: 23rd Annual IEEE Conference on Computational Complexity (CCC 2008)*, pp. 187–198, College Park, Maryland, USA, June 22–26, 2008. An oral presentation.
Available as arXiv:0712.2163 [quant-ph], Dec. 2007. Revised to v2, April 2008.
Also presented at the *11th Workshop on Quantum Information Processing (QIP 2008)* as oral presentation, New Delhi, India, Dec. 17–21, 2007.
- [8] Generating facets for the cut polytope of a graph by triangular elimination.
David Avis, Hiroshi Imai and Tsuyoshi Ito.
Mathematical Programming, 112(2):303–325, Apr. 2008.
Manuscript appeared at arXiv:math.CO/0601375, Jan. 2006. Revised in v2, June 2006.
An oral presentation, *CORS/Optimization Days 2006 Joint Conference*, Montreal, Quebec, Canada, May 8–10, 2006.
- [9] New classes of facets of cut polytope and tightness of I_{mm22} Bell inequalities.
David Avis and Tsuyoshi Ito.
Discrete Applied Mathematics, 155(13):1689–1699, Aug. 2007.
Manuscript appeared at arXiv:math.CO/0505143, May 2005.
A preliminary version appeared in *Proceedings of the 4th Japanese-Hungarian Symposium on Discrete Mathematics and Its Applications (JH2005)*, pp. 122–128, Budapest, Hungary, June 3–6, 2005. An oral presentation.
- [10] On the relationship between convex bodies related to correlation experiments with dichotomic observables.
David Avis, Hiroshi Imai and Tsuyoshi Ito.
Journal of Physics A: Mathematical and General, 39(36):11283–11299, Sept. 2006.
Manuscript appeared at arXiv:quant-ph/0605148, May 2006.

- [11] Polyhedral and semidefinite approaches to classical and quantum Bell inequalities.
David Avis and Tsuyoshi Ito.
In *Proceedings of Asian Conference on Quantum Information Science 2006 (AQIS 2006)*, 8 pages, Beijing, China, Sept. 1–4, 2006. An oral presentation.
- [12] Bell inequalities stronger than the Clauser–Horne–Shimony–Holt inequality for three-level isotropic states.
Tsuyoshi Ito, Hiroshi Imai and David Avis.
Physical Review A, vol. 73, article no. 042109, 9 pages, Apr. 2006.
Manuscript: Bell inequalities stronger than the CHSH inequality for 3-level isotropic states, arXiv:quant-ph/0508210, Aug. 2005. Revised to v2, Jan. 2006.
- [13] Some open problems on Bell inequalities and partial solutions to them.
Tsuyoshi Ito, Hiroshi Imai and David Avis.
Technical report, The 13th Quantum Information Technology Symposium (QIT13), Sendai, Japan, Nov. 24–25, 2005.
- [14] Bell inequalities: combinatorial derivation and relevance.
Tsuyoshi Ito.
An oral presentation, *1st Doctoral Workshop on Mathematical and Engineering Methods in Computer Science (MEMICS 2005)*, Znojmo, Czech, Oct. 14–17, 2005.
- [15] Two-party Bell inequalities derived from combinatorics via triangular elimination.
David Avis, Hiroshi Imai, Tsuyoshi Ito and Yuuya Sasaki.
Journal of Physics A: Mathematical and General, 38(50):10971–10987, Dec. 2005.
Manuscript appeared at arXiv:quant-ph/0505060, May 2005. Revised to v3, Sept. 2005.
- [16] Relevance relation among Bell inequalities of 2-valued measurements in multilevel system.
Tsuyoshi Ito.
A poster presentation, *the 12th Quantum Information Technology Symposium (QIT12)*, Atsugi, Japan, May 12–13, 2005. Technical Report No. QIT2005-33, in Japanese.
- [17] Test of relevance relation between Bell inequalities using nonlinear and semidefinite programming.
David Avis, Hiroshi Imai, Tsuyoshi Ito and Yuuya Sasaki.
An oral presentation, *the 11th Quantum Information Technology Symposium (QIT11)*, Kyoto, Japan, Dec. 6–7, 2004. Technical Report No. QIT2004-57, in Japanese.
- [18] Families of tight Bell inequalities derived from classes of facets of cut polytopes.
Tsuyoshi Ito, Yuuya Sasaki, Hiroshi Imai and David Avis.
In *Proceedings of ERATO Conference on Quantum Information Science 2004 (EQIS'04)*, pp. 78–79, Tokyo, Japan, Sept. 1–5, 2004. An oral presentation.

- [19] Finding yozume of generalized tsume-shogi is exptime-complete.
Takayuki Yato, Takahiro Seta and Tsuyoshi Ito.
IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences, Special Section on Discrete Mathematics and Its Applications, E88-A(5):1249–1257, May 2005.
A preliminary version appeared in IEICE Technical Report No. COMP2004-21, the Institute of Electronics, Information and Communication Engineers, June 2004, in Japanese.
- [20] Triangular elimination of facets of cut polytopes and Bell inequalities in quantum information theory.
Tsuyoshi Ito.
An oral presentation, *Seminars on Algorithms in Operations Research (SAOR)*, Tsukuba, Japan, May 29–30, 2004.
- [21] Bell inequalities derived from combinatorics.
Yuuya Sasaki, Tsuyoshi Ito, Hiroshi Imai and David Avis.
The 10th Quantum Information Technology Symposium (QIT10), Tokyo, Japan, May 24–25, 2004. Technical Report No. QIT2004-12, in Japanese.
- [22] Deriving tight Bell inequalities for 2 parties with many 2-valued observables from facets of cut polytopes.
David Avis, Hiroshi Imai, Tsuyoshi Ito and Yuuya Sasaki.
Preprint, arXiv:quant-ph/0404014, April 2004. Revised in v3, April 2004.
This preprint was superseded by [15].
- [23] Compact encoding of the Web Graph exploiting various power distributions.
Yasuhito Asano, Tsuyoshi Ito, Hiroshi Imai, Masashi Toyoda and Masaru Kitsuregawa.
IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences, Special Section on Discrete Mathematics and Its Applications, E87-A(5):1183–1184, May 2004.
A preliminary version appeared under the title “Compact encoding of the Web Graph exploiting various power laws — statistical reason behind Link Database.”
In *Advances in Web-Age Information Management: Proceedings of 4th International Conference on Web-Age Information Management (WAIM 2003)*, pp. 37–46, vol. 2762 of *Lecture Notes in Computer Science*, Springer, Chengdu, China, Aug. 17–19, 2003.
- [24] Theoretical analysis of performances of TCP/IP congestion control algorithm with different distances.
Tsuyoshi Ito and Mary Inaba.
In *NETWORKING 2004, Networking Technologies, Services, and Protocols; Performance of Computer and Communication Networks; Mobile and Wireless Communication: Proceedings of 3rd International IFIP-TC6 Networking Conference (NETWORKING 2004)*, pp. 962–973, vol. 3042 of *Lecture Notes in Computer Science*, Springer, Athens, Greece, May 9–14, 2004. An oral presentation.

A preliminary version appeared under the title “Theoretical analysis of throughput of TCP/IP congestion control algorithm with different distances.”

In *IPJS SIG Technical Report* No. 2003-AL-93-8, Information Processing Society of Japan, Jan. 2004.

- [25] End-node transmission rate control kind to intermediate routers — towards 10 Gbps era.
Makoto Nakamura, Junsuke Sembon, Yutaka Sugawara, Tsuyoshi Itoh, Mary Inaba and Kei Hiraki.
2nd International Workshop on Protocols for Fast Long-Distance Networks (PFLDnet 2004), Feb. 16–17, 2004.
- [26] Reformalization and implementation of fully dynamic algorithm for transitive closure on directed graphs.
Tsuyoshi Ito and Hiroshi Imai.
IPJS SIG Notes No. 2002-AL-84-2, Information Processing Society of Japan, May 2002. Reformalization and implementation of fully dynamic algorithm for transitive closure on directed graphs. An oral presentation.

Theses

- [27] Bell inequalities and the cut polytope: Bridging quantum information science and combinatorial optimization.
Ph.D. Thesis, Department of Computer Science, Graduate School of Information Science and Technology, the University of Tokyo, Dec. 2006.
- [28] Analyses of flow time and fairness of TCP congestion control algorithms in wide area networks.
Master Thesis, Department of Computer Science, Graduate School of Information Science and Technology, the University of Tokyo, Feb. 2004.
- [29] Reformalization and implementation of fully dynamic algorithm for transitive closure on directed graphs.
Senior Thesis, Department of Information Science, Faculty of Science, the University of Tokyo, Feb. 2002.