Frank (Peng) Fu

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Education

- Ph.D. Department of Computer Science, University of Iowa, Iowa City, Iowa, USA. September 2009 – August 2014. Advisor: Aaron Stump. Thesis Title: Lambda encodings in type theory.
- B.Eng. School of Computer Science, Huazhong University of Science and Technology, Wuhan, Hubei, China. September 2005 – June 2009.

Academic positions

- Postdoctoral Researcher, Dalhousie University, Halifax, Nova Scotia, Canada. May 2017 to present.
- Lecturer (co-instructor), Discrete Structures I (online), Dalhousie University, Canada. May 1, 2020 to July 31, 2020.
- Lecturer, Discrete Structures I, Dalhousie University, Canada. May 1, 2019 to July 31, 2019.
- Postdoctoral Researcher, University of Dundee and Heriot-Watt University, Scotland, UK. October 2014 to August 2016.

Refereed journal publications

J1 **Linear dependent type theory for quantum programming languages**.

Peng Fu, Kohei Kishida, Peter Selinger, accepted in the special issue of Logical Methods in Computer Science (LMCS) devoted to selected papers from LICS 2020

J2 **Operational semantics of resolution and productivity in horn clause logic**.

Peng Fu, Ekaterina Komendantskaya. Formal Aspect of Computing, 2017. Journal Version of C5.

J3 **Efficiency of lambda-encodings in total type theory**.

Aaron Stump, Peng Fu. Journal of Functional Programming, 2016.

Refereed conference publications

C1 **A biset-enriched categorical model for Proto-Quipper with dynamic lifting**.

Peng Fu, Kohei Kishida, Neil J. Ross, Peter Selinger, 19th International Conference on Quantum Physics and Logic, QPL 2022.

C2 **Linear dependent type theory for quantum programming languages**.

Peng Fu, Kohei Kishida, Peter Selinger, 35th Annual ACM/IEEE Symposium on Logic in Computer Science, LICS 2020.

C3 **A tutorial introduction to quantum circuit programming in dependently typed Proto-Quipper**.

Peng Fu, Kohei Kishida, Neil J. Ross, Peter Selinger, 12th Conference on Reversible Computation, RC 2020.

C4 **Proof relevant corecursive resolution**.

Peng Fu, Ekaterina Komendantskaya, Tom Schrijvers, Andrew Pond. 13th International Symposium on Functional and Logic Programming, FLOPS 2016.

C5 **A type-theoretic approach to resolution**.

Peng Fu, Ekaterina Komendantskaya. 25th International Symposium on Logic-Based Program Synthesis and Transformation, LOPSTR 2015.

C6 **Self types for dependently typed lambda encodings**.

Peng Fu, Aaron Stump. Joint 25th International Conference on Rewriting Techniques and Applications and 12th International Conference on Typed Lambda Calculi and Applications, RTA-TLCA 2014.

Refereed workshop publications

W1 **Equational reasoning about programs with general recursion and call-by-value semantics**.

Garrin Kimmell, Aaron Stump, Harley Eades III, **Peng Fu**, Tim Sheard, Stephanie Weirich, Chris Casinghino, Vilhelm Sjöberg, Nathan Collins, Ki Yung Ahn. Programming Languages meets Program Verification, PLPV 2012.

W2 **Irrelevance, heterogeneous equality, and call-by-value dependent type Systems**.

Vilhelm Sjöberg,Chris Casinghino, Ki Yung Ahn, Nathan Collins, Harley Eades III, **Peng Fu**, Garrin Kimmell, Tim Sheard, Aaron Stump, Stephanie Weirich. Mathematically Structured Functional Programming, MSFP 2012.

W3 **A framework for internalizing relations into type theory**.

Peng Fu, Aaron Stump, Jeff Vaughan. International Workshop on Proof-Search in Axiomatic Theories and Type Theories, PSATTT 2011.

Manuscripts

M1 **On the Lambek embedding and the category of product-preserving presheaves**.

Peng Fu, Kohei Kishida, Neil J. Ross, Peter Selinger, 2022, Preprint available at arXiv: `https://arxiv.org/abs/2205.06068`.

M2 **Proto-Quipper with dynamic lifting**.

Peng Fu, Kohei Kishida, Neil J. Ross, Peter Selinger, 2022, Preprint available at arXiv: `https://arxiv.org/abs/2204.13041`.

M3 **Dependently typed folds for nested data types**.

Peng Fu, Peter Selinger, 2018, Preprint available at arXiv: `https://arxiv.org/abs/1806.05230`.

M4 **A type checking algorithm for higher-rank, impredicative and second-order Types**.

Peng Fu, 2017, Preprint available at arXiv: `http://arxiv.org/abs/1711.04718`.

M5 **Representing nonterminating rewriting with $\mathbf{F}_2^\mu$**.

Peng Fu, 2017, Preprint available at arXiv: `http://arxiv.org/abs/1706.00746`.

Conference and workshop presentations

- **Proto-Quipper with dynamic lifting**, June 27th - July 1st, 2022, 19th International Conference on Quantum Physics and Logic, Oxford, UK.
- **A biset-enriched categorical model for Proto-Quipper with dynamic lifting**, June 27th - July 1st, 2022, 19th International Conference on Quantum Physics and Logic, Oxford, UK.
- **A biset-enriched categorical model for Proto-Quipper with dynamic lifting**, June 21st - June 26th, 2022, 29th Foundational Methods in Computer Science Workshop (FMCS), University of Calgary, Canada.
- **Proto-Quipper: a quantum programming language**, July 2nd, 2021, Logic, Quantum Computing, and Artificial Intelligence, Online workshop.
- **Linear dependent theory for quantum programming languages**, June 11th, 2021, 18th International Conference on Quantum Physics and Logic, Online conference.
- **Linear dependent theory for quantum programming languages**, July 8th, 2020, 35th Annual ACM/IEEE Symposium on Logic in Computer Science, Online conference.
- **A tutorial introduction to quantum circuit programming in dependently typed Proto-Quipper**, July 10th, 2020, 12th Conference on Reversible Computation, Online conference.
- **Dependent types in Proto-Quipper**, September 20, 2018, Dagstuhl Seminar: Quantum Programming Languages, Dagstuhl, Germany.
- **Proof relevant corecursive resolution**. June 22, 2016, The Scottish Programming Languages Seminar, Heriot-Watt University, Edinburgh, UK.
- **A type-theoretic approach to structural resolution**. July 13, 2015, 25th International Symposium on Logic-Based Program Synthesis and Transformation, Siena, Italy.
- **Self types for dependently typed lambda encodings**. July 15, 2014, Joint 25th International Conference on Rewriting Techniques and Applications and 12th International Conference on Typed Lambda Calculi and Applications, Vienna, Austria.
- **Dependent lambda encoding with self types**. September 2013, ACM SIGPLAN Workshop on Dependently-Typed Programming(DTP), Boston, MA.
- **A framework for internalizing relations into type theory**. August 2011, International Workshop on Proof-Search in Axiomatic Theories and Type Theories, Wroclaw. Poland.

Teaching experience

- Teaching assistant, "Topic in Logics: theorem proving in Agda", 2021 Spring, Dalhousie University.
- Lecturer (Co-instructor), "Discrete structures I", 2020 Summer, Dalhousie University.
- Lecturer, "Discrete structures I", 2019 Summer, Dalhousie University.
- Teaching Assistant, "Introduction to functional programming in Haskell", 2015 Spring. Computer Science, University of Dundee.
- Graduate Teaching Assistant, "Programming Language Concepts", 2013 Spring, 2014 Spring. Department of Computer Science, The University of
- Graduate Teaching Assistant, "Object-Oriented Software Development ", 2013 Fall. Department of Computer Science, The University of Iowa.

- Graduate Teaching Assistant, "Computer Networking", 2009 Fall. Department of Computer Science, The University of Iowa.

Professional activities

- Organizer. Atlantic Category Theory Seminar (2022 winter-present).
- Program committee. The Third International Workshop on Programming Languages for Quantum Computing (PLanQC 2022).
- External Reviewer. 19th International Conference on Quantum Physics and Logic (QPL 2022).
- Reviewer. Theoretical Computer Science (2022). Reviewed: 1 paper.
- Reviewer. Logical Methods in Computer Science (2021). Reviewed: 1 paper.
- Reviewer. Quantum journal (2020). Reviewed: 1 paper.
- External Reviewer. 24th International Conference on Rewriting Techniques and Applications (RTA 2013). Reviewed: 1 paper.
- External Reviewer. 19th International Conference on Foundations of Software Science and Computation Structures (FoSSaCS 2016). Reviewed: 1 paper.
- External Reviewer. 32nd International Conference on Logic Programming (ICLP 2016). Reviewed: 1 paper.