

# Vladimir Zamdzhiev

*Research Scientist*

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Nationality: Bulgarian

## Employment

- 10/2020 – **Permanent Researcher**, *Inria*, Nancy, France.  
Permanent researcher in the [MOCQUA team](#) at Inria/LORIA.
- 09/2018 – **Postdoctoral Fellow**, *LORIA*, Nancy, France.  
09/2020 Supported by the [ANR/SoftQPRO](#) and PIA-GDN/Quantex projects. The LORIA side of the project is concerned with the design and analysis of quantum programming languages. Principal Investigator: [Simon Perdrix](#).
- 09/2016 – **Postdoctoral Fellow**, *Tulane University*, New Orleans, USA.  
08/2018 Supported by the MURI project [Semantics, Formal Reasoning, and Tools For Quantum Programming](#). The aim of the Tulane part of the project is to develop categorical models for quantum programming languages. Principal Investigator: [Michael Mislove](#).

## Education

- 2012–2016 **PhD Computer Science**, *University of Oxford*.  
Thesis: [Rewriting Context-free Families of String Diagrams](#).  
Supervisors: [Samson Abramsky](#), [Bob Coecke](#) and [Aleks Kissinger](#).  
Examiners: [Sam Staton](#) (internal) and [Reiko Heckel](#) (external).
- 2011–2012 **MSc Computer Science (Distinction)**, *University of Oxford*.  
Focus on Categorical Quantum Mechanics and Computer-aided Formal Verification.  
Thesis: [An Abstract Approach towards Quantum Secret Sharing](#).  
Supervisor: [Bob Coecke](#).
- 2008–2011 **BSc Mathematics, BSc Computer Science**, *Jacobs University Bremen*.  
Double major in Computer Science and Mathematics.

## Research Interests

- Quantum and Probabilistic Programming Languages
- Categorical Quantum Mechanics
- String Diagrams
- Category theory

## Preprints

- 2021 *Semantics for Probabilistic and Quantum Effects*, with Xiaodong Jia, Bert Lindenhovius and Michael Mislove. In preparation. [[current draft](#)]

- 2020 *Quantum Programming with Inductive Datatypes*, with Romain Péchoux, Simon Perdrix and Mathys Rennela. Submitted. [[pdf](#)]

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## Journal Publications

- 2020 *LNL-FPC: The Linear/Non-linear Fixpoint Calculus*, with Bert Lindenhovius and Michael Mislove. **LMCS (Logical Methods in Computer Science)**, to appear. [[arxiv](#)]

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## Conference and Workshop Publications

- 2021 *Commutative Monads for Probabilistic Programming Languages*, with Xiaodong Jia, Bert Lindenhovius and Michael Mislove. **LICS 2021 (Logic in Computer Science)**, to appear. [[arxiv](#)]
- 2020 *Computational Adequacy for Substructural Lambda Calculi*. **ACT 2020 (Applied Category Theory)**. [[doi](#) = [arxiv](#)]
- 2020 *Semantics for first-order affine inductive data types via slice categories*. **CMCS 2020 (Coalgebraic Methods in Computer Science)**. [[doi](#) | [arxiv](#)]
- 2020 *Quantum Programming with Inductive Datatypes: Causality and Affine Type Theory*, with Romain Péchoux, Simon Perdrix and Mathys Rennela. **FoSSaCS 2020 (Foundations of Software Science and Computation Structures)**. [[doi](#) | [arxiv](#)]
- 2019 *Mixed Linear and Non-linear Recursive Types*, with Bert Lindenhovius and Michael Mislove. **ICFP 2019 (International Conference on Functional Programming)**. [[doi](#) | [arxiv](#)]
- 2019 *Reflecting Algebraically Compact Functors*. **ACT 2019 (Applied Category Theory)**. [[doi](#) = [arxiv](#)]
- 2018 *Enriching a Linear/Non-linear Lambda Calculus: A Programming Language for String Diagrams*, with Bert Lindenhovius and Michael Mislove. **LICS 2018 (Logic in Computer Science)**. [[doi](#) | [arxiv](#)]
- 2018 *A Framework for Rewriting Families of String Diagrams*. **TERMGRAPH 2018 (Computing with Terms and Graphs)**. [[doi](#) = [arxiv](#)]
- 2015 *Quantomatic: A Proof Assistant for Diagrammatic Reasoning*, with Aleks Kissinger. **CADE 2015 (Conference on Automated Deduction)**. [[doi](#) | [arxiv](#)]
- 2015 *Equational Reasoning with Context-Free Families of String Diagrams*, with Aleks Kissinger. **ICGT 2015 (International Conference on Graph Transformation)**. [[doi](#) | [arxiv](#)]
- 2015 *!-graphs with trivial overlap are context-free*, with Aleks Kissinger. **GaM 2015 (Graphs as Models)**. [[doi](#) = [arxiv](#)]
- 2014 *The ZX-calculus is incomplete for quantum mechanics*, with Christian Schröder de Witt. **QPL 2014 (Quantum Physics and Logic)**. [[doi](#) = [arxiv](#)]
- 2009 *MathML-aware Article Conversion from LaTeX*, with Heinrich Stamerjohanns, Deyan Ginev, Catalin David, Dimitar Misev and Michael Kohlhase. **DML 2009 (Towards a Digital Mathematics Library)**. [[published version](#)]

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## Special Issue Publications

- 2021 *Semantics for a Lambda Calculus for String Diagrams*, with Bert Lindenhovius and Michael Mislove. **Outstanding Contributions to Logic (Volume for Samson Abramsky)**, to appear. [[pdf](#)]

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## Program Committees

- 2021 ACT 2021. PC member for the international conference on Applied Category Theory in 2021.
- 2021 QPL 2021. PC member for the international conference on Quantum Physics and Logic in 2021.
- 2021 PPlanQC 2021. PC member for the international workshop on Programming Languages for Quantum Computing in 2021.

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## Organisation

- 2020 **MFPS & QPL 2020**. Organiser for the joint virtual conferences during the Covid-19 pandemic.

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## Supervision

- 2021 Two research internships March – September 2021. First is about a quantum extension to Quantitative Type Theory; second is to implement it as a domain-specific language within Idris 2.

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## Research Visits

- Lorentz Center (Leiden, The Netherlands). [Logic and Structure in Computer Science and Beyond](#) (9.12.2019 - 13.12.2019).
- Schloss Dagstuhl – Leibniz Center for Informatics (Wadern, Germany). [Quantum Programming Languages](#) (16.09.2018 – 21.09.2018).
- Lorentz Center (Leiden, The Netherlands). [Logical Aspects of Quantum Information](#) (30.07.2018 - 3.08.2018).
- Simons Institute for the Theory of Computing (UC Berkeley). [Logical Structures in Computation](#) (17.11.2016 - 16.12.2016).

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## Reviewing

Conferences **CSL 2021** (Computer Science Logic), **QIP 2020** (Quantum Information Processing), **FoSSaCS 2020** (Foundations of Software Science and Computation Structures), **LICS 2018/2019(x3)/2020(x3)/2021** (Logic in Computer Science), **MFCS 2017** (Mathematical Foundations of Computer Science).

Journals **LMCS** (Logical Methods in Computer Science), **TOPLAS** (ACM Transactions on Programming Languages and Systems), **ACS** (Applied Categorical Structures).

Series **Outstanding Contributions to Logic (Volume for Samson Abramsky)**.

## Teaching Experience

- 2021 **Lecturer**, *Université de Lorraine*.  
Lecturer for the course "Quantum Computing" (Master Level, 12 teaching hours).
- 2021 **Lecturer**, *Université de Lorraine*.  
Lecturer for the course "Programming in Haskell" (Master Level, 24 teaching hours).
- 2017 **Lecturer**, *Tulane University*.  
Lecturer for the course "Discrete Mathematics" (Bachelor Level, 36 teaching hours).
- 2013–2015 **Teaching assistant**, *University of Oxford*.  
Teaching assistant for the courses "Lambda Calculus and Types" (Bachelor Level), "Quantum Computer Science"×2 (Master/PhD Level), "Categorical Quantum Mechanics"×2 (Master/PhD Level) and "Categories, Proofs and Processes" (Master/PhD Level). 8 teaching hours per course.
- 2010–2011 **Teaching assistant**, *Jacobs University Bremen*.  
Teaching assistant for the courses "Formal Languages and Logic" (Bachelor Level), "Computability and Complexity" (Bachelor Level) and "Operating Systems" (Bachelor Level). 12 teaching hours per course.

## Talks (Selection)

For a full list of talks, together with slides, see [my website](#).

### Invited Talks (international conferences)

- 2020 *Inductive and Recursive Types for Quantum Programming*. **Joint special session of QPL 2020 (Quantum Physics and Logic) and MFPS 2020 (Mathematical Foundations of Programming Semantics) on Quantum Programming Languages**. June 2020.

### Invited Talks (international seminars, special events, etc.)

- 2018 *Recursive types for linear/non-linear quantum programming*. **Dagstuhl Seminar on Quantum Programming Languages**. Wadern, Germany.
- 2018 *Baby's First Diagrammatic Calculus for Quantum Information Processing*. **Logical Aspects of Quantum Information**. Lorentz Center, Leiden, The Netherlands.
- 2018 *Programming String Diagrams*. **Celebrating 10 years of the ZX-calculus**. University of Oxford.
- 2017 *Categorical models of circuit description languages*. **Duskofest 2017**. Oxford, UK.
- 2017 *Rewriting Families of Quantum Circuits*. **Logic Lounge**. Simons Institute (UC Berkeley, USA).
- 2014 *Quantomatic – current state and case study*. **Celebrating 10 years of Categorical Quantum Mechanics**. University of Oxford.

### Invited Talks (external group seminars)

- 2020 *Quantum Programming with Inductive Datatypes: Causality and Affine Type Theory*. **Invited seminar talk**. LRI, Saclay, France.
- 2020 *Quantum Programming with Inductive Datatypes: Causality and Affine Type Theory*. **Invited seminar talk**. IRIF, Paris, France.

2015 *Equational reasoning with context-free families of string diagrams*. **Invited seminar talk**. Radboud University, Nijmegen, The Netherlands.

#### Invited Talks (broad audience)

2017 *Security in a Quantum World*. **NOLASEC**. New Orleans, LA, USA.

2016 *Quantum Computing: the Good, the Bad and the (not so) Ugly*. **Oriel Talks**. Oriel College, University of Oxford.

2016 *Higher-order rewriting of Quantum Circuits*. **CantaBulgarian Conference**. Oxford and Cambridge Club (London, UK).

#### Contributed Talks (not in formal proceedings)

2019 *Quantum Programming with Inductive Datatypes: Causality and Affine Type Theory*. **ACT 2019**. University of Oxford.

2019 *Mixed Linear and Non-linear Recursive Types*. **ACT 2019**. University of Oxford.

2019 *Quantum Programming with Inductive Datatypes: Causality and Affine Type Theory*. **CALCO 2019**. University of Oxford.

2018 *Enriching a linear/non-linear lambda calculus: a programming language for string diagrams*. **QPL 2018**. Dalhousie University.

2017 *Rewriting Families of String Diagrams*. **STRING 2017**. Oxford, UK.

2016 *Grammar transformation with DPO rewriting*. **GaM 2016**. Technische Universiteit Eindhoven.

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## Achievements

- **Scatcherd Scholarship** for the maximum duration of 3 years (fully-funded scholarship awarded to 9 European graduate students at University of Oxford).
- MSc degree awarded with distinction for high academic performance.
- Member of the President's List for academic achievement for all three academic years at Jacobs University Bremen.