

Titouan Carette

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Research interests

I am particularly interested in the design of graphical languages for quantum computing. This implies using abstract categorical frameworks allowing the extension of classical concepts to the quantum setting. Precisely, I work on props and string diagrams, mostly ZX-calculus. Recently, I started to investigate the use of graphical languages beyond quantum computing. I am also interested in the theory of programming languages, category theory in general, and the foundations of quantum physics.

Conference papers

Quantum Algorithms and Oracles with the Scalable ZX-calculus,
Titouan Carette, Yohann D’Anello, Simon Perdrix, QPL 2021,
DOI: 10.4204/EPTCS.343.10

**Graphical Language with Delayed Trace:
Picturing Quantum Computing with Finite Memory,**
Titouan Carette, Marc De Visme, Simon Perdrix, LICS 2021,
DOI: 10.1109/LICS52264.2021.9470553

A recipe for quantum graphical languages,
Titouan Carette, Emmanuel Jeandel, ICALP 2020,
DOI: 10.4230/LIPIcs.ICALP.2020.118

SZX-calculus: Scalable Graphical Quantum Reasoning,
Titouan Carette, Dominic Horsman, Simon Perdrix, MFCS 2019,
DOI: 10.4230/LIPIcs.MFCS.2019.55

Completeness of Graphical Languages for Mixed States Quantum Mechanics,
Titouan Carette, Simon Perdrix, Renaud Vilmart, Emmanuel Jeandel, ICALP 2019,
DOI: 10.4230/LIPIcs.ICALP.2019.108

Extended Learning Graphs for Triangle Finding,
Titouan Carette, Mathieu Laurière, Frédéric Magniez, STACS 2017,
DOI: 10.4230/LIPIcs.STACS.2017.20

Journals

Extended Learning Graphs for Triangle Finding,
Titouan Carette, Mathieu Laurière, Frédéric Magniez, Algorithmica,
DOI: 10.1007/s00453-019-00627-z

Teaching

At Polytech Paris-Saclay, a French public school of engineering in information technology:

2021: Introduction to quantum computing (Master)

At University Paris-Saclay, in the ARTEQ year of interdisciplinary training in quantum technologies:

2021: Elements of computing for quantum technologies (Master)

At Télécom Nancy, a French public school of engineering in information technology:

2020: Algorithmics in Python (Bachelor), Unix Shell in Bash (Bachelor), Graphs and Operational Research (Master)

2019: Algorithmics in Scala (Bachelor), Unix Shell in Bash (Bachelor), Graphs and Operational Research (Master)

2018: Algorithmics in Scala (Bachelor), Data structures in C (Bachelor)

Positions

2021-Now: Post Doc, Université Paris-Saclay, Team Quacs.

2018-2021: PhD, LORIA, Université de Lorraine,
supervised by Simon Perdrix and Emmanuel Jeandel.

2018: Internship, *Diagrammatic languages for quantum computing*, LORIA, Nancy, France,
supervised by Simon Perdrix.

2016: Internship, *Effectus theory and Isbell duality*, Oxford computer science department,
supervised by Sam Staton.

2015: Internship, *Learning graphs for triangle finding*, LIAFA, Paris,
supervised by Frédéric Magniez.

Education

2021: Ph.D. in Computer Science (Université de Lorraine)

2018: MSc in Theoretical Computer Science (ENS de Lyon)

2017: Agrégation de mathématiques option informatique (ENS de Lyon)

A French competitive exam allowing to teach mathematics in high schools.

2016: BSc in Mathematics and Applications (Université Claude-Bernard Lyon 1)

2016: BSc in Theoretical Computer Science (ENS de Lyon)

Languages

French: Native

English: Fluent

Russian: Beginner

Latex: Fluent

ZX-calculus: Fluent

Spanish: Beginner

Python: Intermediate

λ -calculus: Fluent

Talks

01/07/2021, online, LICS 2021,

Graphical Language with Delayed Trace:

Picturing Quantum Computing with Finite Memory

09/07/2020, online, ICALP 2020,

A Recipe for Quantum Graphical Languages

06/06/2020, online, QPL 2020,

SZX: scalable graphical calculus

29/11/2019, Besançon, GT IQ,
SZX: scalable graphical calculus

16/10/2019, Lyon, GT LHC,
Diagrammatic Methods in Quantum Computing

05/03/2019, Marseille, EJCIM 2019,
Fantastic diagrams and how to bend them

28/08/2019, Aachen, MFCS 2019,
SZX-calculus: Scalable Graphical Quantum Reasoning

27/07/2019, Mézeyrac, L'Agape 2019,
Introduction to (linear) logics for physicists

10/07/2019, Patras, ICALP 2019,
Completeness of Graphical Languages for Mixed States Quantum Mechanics

21/07/2018, Mézeyrac, L'Agape 2018,
A tovariance principle?

29/03/2018, Nancy, EJCIM 2018,
Un soupçon de catégories servi sur son lit de logique quantique

24/01/2018, Lyon, MMI, Séminaire de la détente mathématique,
Scoubidoubidouwha! Diagrammes et catégories monoïdales tressées

19/09/2017, Lyon, Association ConférEns, Open Minds,
Devenez maître du multivers avec une astuce bizarre

29/07/2017, Mézeyrac, L'Agape 2017,
Computer Scientist Megalomania

15/02/2017, Nancy, LORIA, Team CARTE seminar,
Effectuses, a probabilistic landscape

20/10/2016, Luminy, Logic seminar of the I2M,
Effectuses, land of probabilities

27/01/2016, Lyon, MMI, Séminaire de la détente mathématique,
Pourquoi faut-il être gentil avec les ordinateurs quantiques ?

Supervision

01/06/2020 to 23/07/2020, Yohann D'Anello, L3 ENS Paris-Sclay, research internship,
Approche diagrammatique de l'informatique quantique, with Simon Perdrix.

Review

Subreviewer for QPL 2020
Subreviewer for FOSSACS 2020

Subreviewer for LICS 2020
Subreviewer for QPL 2021
Subreviewer for MFCS 2021

Organization

I was part of the organizing team of L'Agape 2020, a summer school in Theoretical Physics.