Alexis **TOUMI**

🌐 alexis.toumi.xyz   ✉ alexis@toumi.email   127 avenue Jean Jaurès, 75019 Paris, France

EDUCATION

2018 – 2022 **D.Phil. Computer Science**, *University of Oxford*.
Thesis: "Category Theory for Quantum Natural Language Processing", see [9, 6, 10].
Supervisors: Prof. Bob Coecke and Dr. Dan Marsden. *Examiners:* Prof. Sam Staton (University of Oxford) and Prof. Dr. Michael Moortgat (Utrecht University).

2016 – 2018 **M.Sc. Mathematics & Computer Science**, *University of Oxford*, Distinction.
Thesis: "Categorical Compositional Distributional Questions, Answers & Discourse Analysis", see [15, 16]. *Supervisor:* Prof. Bob Coecke.

2012 – 2015 **B.Sc. Computer Science**, *University of Oxford*, First-Class Honours.
Thesis: "Equilibrium Checking in Reactive Modules Games", see [17, 18]. *Supervisors:* Prof. Michael Wooldridge and Dr. Julian Gutierrez.

AWARDS

2018 **Oxford – DeepMind Graduate Scholarship in Computer Science**.

2018 **Wolfson Harrison UK Research Council Quantum Foundation Scholarship**.

2013 **New College Academic Scholarship**.

TEACHING

2019 **Quantum Computer Science**, *University of Oxford*, Class Tutor.

2019 **Logic & Proof**, *University of Oxford*, Class Tutor.

2018 **Computational Complexity**, *University of Oxford*, Class Tutor.

2018 **Data Science with Python**, *ESILV Paris*, Teaching Assistant.

WORK EXPERIENCE

Oct 2022 – **Post-doctoral researcher**, *Laboratoire d'Informatique & Systèmes*, Marseille.
Formal methods for quantum cellular automata and distributed quantum computing.

2019 – **Research Scientist**, *Cambridge Quantum Computing*, Oxford, part-time advisor.
Natural language processing on noisy intermediate-scale quantum hardware, see [10, 11, 3].
Applied category theory for quantum computing and artificial intelligence, see [6].

May–Jul 2022 **General Manager**, *Le Lab Quantique*, Paris.
Administration of a French nonprofit that promotes the emergence of quantum technologies.

2017 – 2018 **Data Scientist**, *IRHT (CNRS) & Teklia*, Paris.
Deep learning for the automated analysis of manuscripts from the Middle Ages, see [13].

2015 – 2016 **Machine Learning Engineer**, *Tinyclues*, Paris, Internship.
Tensor factorisation on complex relational data: users, products, emails, clicks and sales.

2014 – 2015 **Data Scientist**, *Yonderlabs*, Berlin, Internship.
Probabilistic graphical models for natural language processing and sentiment analysis.

SOFTWARE

DisCoPy The Python toolkit for computing with string diagrams, *main developer*.

lambeq A Python library for experimental quantum natural language processing, *author*.

LANGUAGES

Human   Native French, fluent English, basic German and beginner Arabic.

Machine   *Fluent:* Python, LaTeX, Markdown, HTML. *Basic:* Javascript, Haskell, SQL, C.

PUBLICATIONS

[1] B. Coecke, G. De Felice, K. Meichanetzidis, and A. Toumi. "How to Make Qubits Speak". In: *Quantum Computing in the Arts and Humanities* (2022). arXiv: 2107.06776.

[2] A. Toumi, G. de Felice, and R. Yeung. "DisCoPy for the Quantum Computer Scientist". In: *QPL* (2022). arXiv: 2205.05190.

[3] D. Kartsaklis, I. Fan, R. Yeung, A. Pearson, R. Lorenz, A. Toumi, G. de Felice, K. Meichanetzidis, S. Clark, and B. Coecke. "Lambeq: An Efficient High-Level Python Library for Quantum NLP". In: *ArXiv e-prints* (2021). arXiv: 2110.04236.

[4] L. McPheat, G. Wijnholds, M. Sadrzadeh, A. Correia, and A. Toumi. "Anaphora and Ellipsis in Lambek Calculus with a Relevant Modality: Syntax and Semantics". In: *ACT* (2021). arXiv: 2110.10641.

[5] A. Toumi and A. Koziell-Pipe. "Functorial Language Models". In: *ACT* (2021). arXiv: 2103.14411.

[6] A. Toumi, R. Yeung, and G. de Felice. "Diagrammatic Differentiation for Quantum Machine Learning". In: *QPL* (2021). arXiv: 2103.07960.

[7] B. Coecke, G. de Felice, K. Meichanetzidis, and A. Toumi. "Foundations for Near-Term Quantum Natural Language Processing". In: *ArXiv e-prints* (2020). arXiv: 2012.03755.

[8] G. de Felice, E. Di Lavore, M. Román, and A. Toumi. "Functorial Language Games for Question Answering". In: *ACT* (2020). DOI: 10.4204/EPTCS.333.21.

[9] G. de Felice, A. Toumi, and B. Coecke. "DisCoPy: Monoidal Categories in Python". In: *ACT* (2020). DOI: 10.4204/EPTCS.333.13.

[10] K. Meichanetzidis, S. Gogioso, G. De Felice, N. Chiappori, A. Toumi, and B. Coecke. "Quantum Natural Language Processing on Near-Term Quantum Computers". In: *QPL* (2020). arXiv: 2005.04147.

[11] K. Meichanetzidis, A. Toumi, G. de Felice, and B. Coecke. "Grammar-Aware Question-Answering on Quantum Computers". In: *ArXiv e-prints* (2020). arXiv: 2012.03756.

[12] D. Shiebler, A. Toumi, and M. Sadrzadeh. "Incremental Monoidal Grammars". In: SYCO 6, Sixth Symposium on Compositional Structures (2020). arXiv: 2001.02296.

[13] E. Boros, A. Toumi, E. Rouchet, B. Abadie, D. Stutzmann, and C. Kermorvant. "Automatic Page Classification in a Large Collection of Manuscripts Based on the International Image Interoperability Framework". In: *ICDAR* (2019). DOI: 10.1109/ICDAR.2019.00126.

[14] G. de Felice, K. Meichanetzidis, and A. Toumi. "Functorial Question Answering". In: *ACT* (2019). DOI: 10.4204/EPTCS.323.6.

[15] B. Coecke, G. de Felice, D. Marsden, and A. Toumi. "Towards Compositional Distributional Discourse Analysis". In: *CAPNS* (2018). DOI: 10.4204/EPTCS.283.1.

[16] B. Coecke, F. Genovese, M. Lewis, D. Marsden, and A. Toumi. "Generalized Relations in Linguistics & Cognition". In: *Theoretical Computer Science* (2018). DOI: 10.1016/j.tcs.2018.03.008.

[17] M. Wooldridge, J. Gutierrez, P. Harrenstein, E. Marchioni, G. Perelli, and A. Toumi. "Rational Verification: From Model Checking to Equilibrium Checking". In: *AAAI* (2016). DOI: 10.1016/j.artint.2017.04.003.

[18] A. Toumi, J. Gutierrez, and M. Wooldridge. "A Tool for the Automated Verification of Nash Equilibria in Concurrent Games". In: *ICTAC* (2015). DOI: 10.1007/978-3-319-25150-9_34.