# Alexis TOUMI

## DEGREES

2018 – 2022 **DPhil Computer Science**, *University of Oxford*.
Oxford–DeepMind Graduate & Harrisson Scholarship for Quantum Foundations.

2016 – 2018 **MSc Mathematics & Foundations of Computer Science**, *University of Oxford*.
Categories, Proofs & Processes (99), Quantum Computer Science (95), Categorical Quantum Mechanics (70), Distributional Models of Meaning (82), Computational Game Theory (98).

2012 – 2015 **BSc Computer Science**, *University of Oxford*, (First-Class Honours).
Lambda Calculus, Computational Complexity, Learning Theory, Knowledge Representation.

## THESES

DPhil Proposal: **Quantum Structures for Linguistics, Cognition and AI**, under the supervision of Prof. Bob Coecke and Dr. Dan Marsden. See [1, 2, 3, 5].

MSc **Categorical Compositional Distributional Questions, Answers & Discourse**, supervised by Prof. Bob Coecke. This followed [6] and [7].

BSc **Equilibrium Checking in Reactive Modules Games**, supervised by Dr. Julian Gutierrez and Prof. Michael Wooldridge. This was followed by [8] and [9].

## PAPERS


[1] 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* (to appear).

[2] G. de Felice, E. Di Lavore, M. Román, and A. Toumi. "Functorial Language Games for Question Answering". In: *Electronic Proceedings in Theoretical Computer Science* 333 (2021).

[3] G. de Felice, A. Toumi, and B. Coecke. "DisCoPy: Monoidal Categories in Python". In: *Electronic Proceedings in Theoretical Computer Science* 333 (2021).

[4] 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: *2019 International Conference on Document Analysis and Recognition, ICDAR 2019, Sydney, Australia, September 20-25, 2019*. IEEE, 2019.

[5] G. de Felice, K. Meichanetzidis, and A. Toumi. "Functorial Question Answering". In: *Proceedings Applied Category Theory 2019, ACT 2019, University of Oxford, UK, 15-19 July 2019*. Ed. by J. Baez and B. Coecke. Vol. 323. EPTCS. 2019.

[6] B. Coecke, G. de Felice, D. Marsden, and A. Toumi. "Towards Compositional Distributional Discourse Analysis". In: *Electronic Proceedings in Theoretical Computer Science* 283 (2018).

[7] B. Coecke, F. Genovese, M. Lewis, D. Marsden, and A. Toumi. "Generalized Relations in Linguistics & Cognition". In: *Theoretical Computer Science* (2018).



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[8] M. Wooldridge, J. Gutierrez, P. Harrenstein, E. Marchioni, G. Perelli, and A. Toumi. "Rational Verification: From Model Checking to Equilibrium Checking". In: *Proceedings of the Thirtieth AAAI Conference on Artificial Intelligence, February 12-17, 2016, Phoenix, Arizona, USA*. 2016.

[9] A. Toumi, J. Gutierrez, and M. Wooldridge. "A Tool for the Automated Verification of Nash Equilibria in Concurrent Games". In: *Theoretical Aspects of Computing - ICTAC 2015 - 12th International Colloquium Cali, Colombia, October 29-31, 2015, Proceedings*. 2015.

## TEACHING

2019 **Quantum Computer Science**, *University of Oxford*, Class Tutor.
String diagrams for quantum processes, ZX-calculus, quantum foundations and algorithms.

2019 **Logic & Proof**, *University of Oxford*, Class Tutor.
Propositional logic, SAT and constraint satisfaction, first-order logic and unification.

2018 **Computational Complexity**, *University of Oxford*, Class Tutor.
Turing machines and reductions, randomisation, introduction to descriptive complexity.

2018 **Data Science with Python**, *ESILV Paris*, Teaching Assistant.
Feature extraction from images, clustering, classification. Methodology for model evaluation.

2012 – **Elementary mathematics, physics and computer science**, Private Tutor.

## INDUSTRY

2019 – 2021 **Research Scientist – Part Time**, *Cambridge Quantum Computing*, Oxford.
Natural language processing on noisy intermediate-scale quantum (NISQ) hardware.

2017 – 2018 **Data Scientist**, *Institut de Recherche et d'Histoire des Textes – CNRS*, Paris.
Deep learning for the automated analysis of manuscripts from the Middle Ages, see [4].

2015 – 2016 **Data Scientist – R&D Intern**, *Tinyclues*, Paris.
Tensor factorisation on complex relational data: users, products, emails, clicks and sales.

2014 – 2015 **Data Scientist – Summer Intern**, *Yonderlabs*, Berlin.
Probabilistic graphical models (HMM and CRF) applied to natural language processing.

## SOFTWARE

I'm the main developer of DisCoPy [3], the Python library for computing with monoidal categories.

## LANGUAGES

Human Fluent in English and French. Basic German and beginner Arabic.

Machine Advanced Python. Working knowledge of Haskell, Scala, C, SQL.

## OTHER

Philosophy Spinoza, Leibniz, Marx, Peirce, Bergson, Wittgenstein, Foucault, Deleuze.

Literature Rimbaud, Baudelaire, Camus, Ionesco, Kafka, Borges, Kundera, Damasio.

Music 10 years of DJing, digital and vinyl. House, Techno, Disco, Funk, World.

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