Alexis TOUMI

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EXPERIENCE

2023 – **PlantingSpace**, *R&D Scientist*
Developing our own blend of symbolic AI and Bayesian inference for program synthesis. Applied category theory for explainable artificial intelligence and natural language processing.

2019 – 2024 **Quantinuum**, *R&D Scientist (part-time)*
Pioneering quantum natural language processing and category theory for quantum ML. [1] *Software:* DisCoPy, the Python toolkit for string diagrams (main author), lambeq (author).

2022 – 2023 **Laboratoire d'Informatique & Systèmes**, *Post-Doctoral Researcher*
Formal methods for quantum cellular automata and distributed quantum computing.

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

2017 – 2018 **Teklia & IRHT (CNRS)**, *Data Scientist*
Deep convolutional neural network for the layout analysis of pages from medieval manuscripts.

2015 – 2016 **Tinyclues**, *Machine Learning Engineer (internship)*
Tensor factorisation of complex relational data for email targeting on ∼100M users.

2014 – 2015 **Yonderlabs**, *Data Scientist (internship)*
Probabilistic graphical models for sentiment analysis, training my first neural word embedding.

EDUCATION

2018 – 2022 **University of Oxford**, *D.Phil. Computer Science*
Thesis: "Category Theory for Quantum Natural Language Processing".
Wolfson Harrison UKRI Quantum Foundation & Oxford-DeepMind Graduate Scholarship.

2016 – 2018 **University of Oxford**, *M.Sc. Mathematics & Computer Science*, Distinction
Thesis: "Categorical compositional distributional question, answer & discourse analysis". [2]

2012 – 2015 **University of Oxford**, *B.Sc. Computer Science*, First-Class Honours
New College Scholarship. *Thesis:* "Equilibrium Checking in Reactive Modules Games". [3]

SELECTED PUBLICATIONS

[1] A. Toumi, R. Yeung, and G. de Felice. "Diagrammatic Differentiation for Quantum Machine Learning". In: *Electron. Proc. Theor. Comput. Sci.* (2021). DOI: 10.4204/EPTCS.343.7.

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

[3] 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 AAAI Conference on Artificial Intelligence* (2016). DOI: 10.1609/aaai.v30i1.9878.

LANGUAGES & OTHER INTERESTS

Machine Python (native), Julia (fluent), Haskell (basic), Rust (beginner).

Human French (native), English (fluent), German (basic), Arabic (beginner).

Other Long-distance running, yoga, philosophy, history, cooking, coffee brewing, DJing.