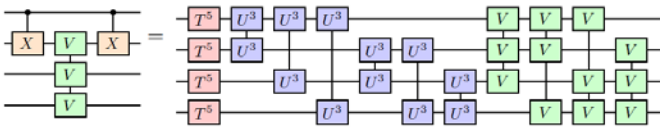
Julien Ross

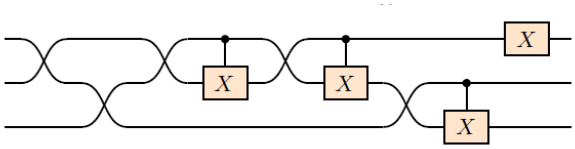
Algebra and Category Theory

Dr. Ross' area of research is **quantum computation**, a new and exciting field of study which lies at the intersection of mathematics, computer science, and physics.



Quantum computers are computing devices which can harness **quantum mechanical phenomena**. The have the potential to solve computational problems much faster than classical computers. However, building a large-scale quantum computer is hard and many problems need to be solved before they become a reality.

His research is part of an ongoing international effort to build quantum computers and draws on a wide variety of mathematical techniques in the pursuit of this goal. The questions that he aims to answer include the following:



- What kind of practical problem could we efficiently solve with a quantum computer?
- What explains the computational advantage of quantum computers?
- How should quantum computers be programmed? How does it differ from the way in which we program classical computers?
- How can we optimize the resources required for quantum computing?

He uses tools from algebra, category theory, number theory, and logic to tackle these problems.

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