



# RESEARCH2REALITY

Shining a light on research & innovation.

## The Computing World is About to Get 'Even Weirder'

An interview with **Robert Raussendorf**, Associate Professor, UBC Physics & Astronomy  
Stewart Blusson Quantum Matter Institute

What I and people like me do is think about the question, how can we harness the quantum for computation? We want to look at these capabilities and now make a fault-tolerant universal quantum computer out of it. The physical basis is different. So we have instead of classical bits we have qubits, and they just have different properties. In a classical bit you have just two states zero and one. In the qubit you have these states, too, but then you have things in between. You have a continuous spectrum of states in between one and two. And now if you go to multiple qubits it gets even weirder. So then you find the phenomenon of entanglement. Quantum particles, qubits included, can be correlated in very weird ways. These correlations can be used for quantum computation as well. So there is a completely new technology out here. Its striking uses have already been demonstrated in isolated examples, but very powerful examples. But by and large we don't know yet what we are dealing with. It's a new form of computation and we want to get our hands at it.

### How has collaboration benefitted your work?

I am having these ideas about how to make a quantum computer robust against decoherence, but what about reality? Why not build it? This is the first time that it becomes in range for me to be part of such an enterprise where a quantum computer is actually built and I can feed in my ideas and then hope to be close when my theoretical ideas are being realized in the real world.

TODAY'S RESEARCH. TOMORROW'S REALITY.