Reality Isn't What We Think It Is

An interview with Professor Raymond Laflamme
Quantum Physicist, University of Waterloo

What exactly are quantum mechanics?

So the world behaves in certain ways, and since we've been born, we've been used to trying to understand some behaviour of the world – try to control it, try to turn it into technology. And we've done this incredibly well with the physics of Newton, Galileo, and Maxwell, that describe the technologies that we have around: the cars, the planes, the computers that we have around. When we go to very small systems – the size of atoms, molecules, the kind of fundamental blocks of nature – the rules of nature change. They're not described by the old rules of Newton; they're described by a new theory, which is called quantum mechanics.

How does your research work?

The work I do is really to learn how to control systems of atoms and molecules so that we can manipulate information with them.

What are the specific applications of your research?

There are two main implications of going from the world of Newton to the world of the quantum; to the world of atoms and molecules. One is about new technologies which are able to do things that we just cannot do with the devices that we have today. We can sense things in much much much finer ways so that we can find where a certain electron is, or a protein there. And so we have a family of technologies which seem to be mind-boggling compared to what we have today. But there is another implication – maybe more profound – it is changing the way that we view reality. And today, we are the place where the ideas, the lab experiments, are turning into devices that can reach the market and can affect all of you. And this is happening a lot faster than when we thought.