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Tin Cans and String Theory

An interview with Professor Aephraim Steinberg
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Quantum Possibilities – What does this mean for the future?

All of the things that we assume must be certain in the real world, although we don't know exactly what the answer is, according to quantum mechanics, may not have one certain answer or another. All of the different answers you think are conceivable can in some sense be part of the bigger reality out there at the same time. So it makes the world a much more complicated but also a much more exciting place if you learn how to describe the simultaneous possibilities. We're trying to figure out how to push the boundaries of technologies that let us really harness quantum phenomena both for applications and just for a deeper understanding of quantum mechanics itself. People have come up with ideas about how these new phenomena can be used to make more powerful computers, more secret communications systems, and many other technologies we are only beginning to envision.

What are you working on specifically?

In my group we look particularly at techniques for manipulating individual particles of matter, atoms, and also individual particles of light known as photons. So photons, many of us know are used as information carriers, but now it's been realized that if we use individual particles of light – tiny tiny particles – we'd be able to communicate in ways that people hadn't thought about in the past. So we're looking at the technologies for doing both of these things.

What does the future hold for your research?

Well it's an amazingly exciting time to be working in quantum mechanics, both technologically and conceptually. We are at the cusp of all sorts of new and exciting things: techniques that allow us to manipulate individual quantum particles; to trap individual ions and control what they are doing; or look at individual photons, store it inside a cavity. There are a handful, six or ten different technologies, that are all beginning to get to this stage where we can really look at individual quantum systems and use them as our fundamental carriers of information.