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## A theory of everything won't provide all the answers

22 January 2013 by [Valerie Jamieson](#) and [Richard Webb](#)

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*We shouldn't be obsessed with finding a theory of everything, says **Lisa Randall**, one of the world's most prominent theoretical physicists*

### Doesn't every physicist dream of one neat theory of everything?

There are lots of physicists! I don't think about a theory of everything when I do my research. And even if we knew the ultimate underlying theory, how are you going to explain the fact that we're sitting here? Solving string theory won't tell us how humanity was born.

### So is a theory of everything a myth?

It's not that it's a fallacy. It's one objective that will inspire progress. I just think the idea that we will ever get there is a little bit challenging.

### But isn't beautiful mathematics supposed to lead us to the truth?

You have to be careful when you use beauty as a guide. There are many theories people didn't think were beautiful at the time, but did find beautiful later - and vice versa. I think simplicity is a good guide: the more economical a theory, the better.

### Is it a problem, then, that our best theories of particle physics and cosmology are so messy?

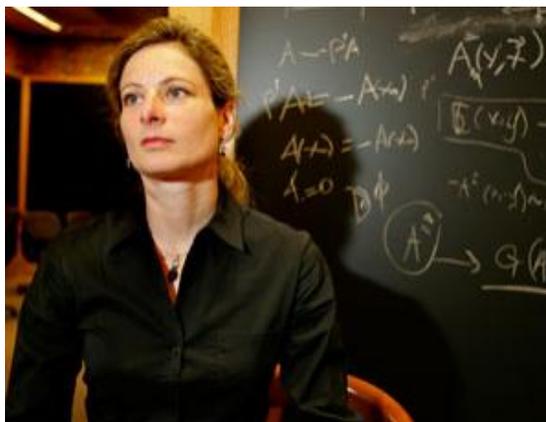
We're trying to describe the universe from  $10^{27}$  metres down to  $10^{-35}$  metres, so it's not surprising there are lots of ingredients. The idea that the stuff we're made of should be everything seems quite preposterous. Dark matter and dark energy - these are not crazy ingredients we're adding.

### Did the discovery of the Higgs boson - the "missing ingredient" of particle physics - take you by surprise last July?

I was surprised that the Large Hadron Collider experiments reached that landmark. I thought the teams would say something very affirming but the announcement of the discovery was amazing. It was a feat of engineering that they got the collision rate up to what it had to be, and the experiments did a better job at analysing the data.

### Are you worried that the Higgs is the only discovery so far at the LHC?

I'm not worried that nothing else exists. But I am worried that the LHC might have too low an energy. Had the Superconducting Super Collider been built in Texas, it would have had almost three times the energy. There is a distinct possibility we'll discover things when the LHC's energy is nearly doubled next year. But it's too early to see signs of warped extra dimensions - they will take longer to find.



"Dark matter and dark energy – these are not crazy ingredients we're adding"

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### What would an extra dimension look like?

The best signature of the warped extra dimensions would be seeing a so-called Kaluza-Klein particle. These are partners of the particles that we know about but they get their momentum from extra dimensions. They would look to us like heavy particles with properties similar to the ones we know, but with bigger masses.

### What if we don't see one? Some argue that seeing nothing else at the LHC would be best, as it would motivate new ideas.

I don't know what dream world they are living in. It would be very hard to make the argument to build a higher energy machine based on the fact that you didn't see something.

### Profile

**Lisa Randall** is a professor of physics at Harvard University. Her recent books are *Knocking on Heaven's Door* (Vintage) and *Higgs Discovery: The power of empty space* (Bodley Head)

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