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Physics: Lisa Randall

Looking at the Earth's tiniest particles to explain the mysteries of the cosmos

By Jerry Adler
Newsweek

Dec. 26, 2005 - Jan 2, 2006 issue - Sometime in 2007, the Large Hadron Collider, the world's most powerful particle accelerator, will start operations near Geneva, Switzerland, and the universe we think we know may disappear in a shower of elementary particles. Few will be watching the results more carefully than a soft-spoken young Harvard professor named Lisa Randall, who has been making a name for herself as one of the most promising theoretical physicists of her generation. That she teaches at a university whose president once publicly doubted that women could compete at the top levels of science interests her far less than what we might find when we begin taking apart protons at 7 trillion volts.

Story continues below ↓

Margaret Salmon & Dean Wiand f

Disproving doubts about women in science

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What she hopes for is nothing less than a glimpse into another spatial dimension, one of several whose existence is predicted by string theory, science's brave attempt to unify all the forces of nature in one grand equation. To account for the fact that we perceive only three dimensions, physicists have proposed that the rest are curled up into infinitesimal loops. But two now famous papers Randall wrote with Raman Sundrum of Johns Hopkins in 1999 proposed a different explanation: that we inhabit a three-dimensional bubble in a universe of 10 or more spatial dimensions, some of which may be infinitely large. In her new book, "Warped Passages," Randall explains how this model helps solve one of the most vexing problems of physics, the enormous disparity in the strength of gravity compared with other fundamental forces. (Gravity is, counterintuitively, much the weakest force—as Randall notes, a small magnet can hold up a paper clip against the pull of the entire Earth.)

Until now, string theory has been an entirely abstract, mathematical construct, but the new supercollider may change all that, and if so—if, for example, it shows evidence of particles that travel in, or through, those extra dimensions—it will represent the first great theoretical breakthrough of the 21st century, blazing a path for physics the way relativity did a century ago. "The cosmos," Randall says, "could be larger, richer and more varied than anything we imagined."

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