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It's outta here!; Prof ventures into new dimension; [All Editions]

PAUL RESTUCCIA. **Boston Herald**. Boston, Mass.: Nov 28, 2005. pg. 024

A young math whiz, [Lisa Randall] tied for first place in the National Westinghouse Science Talent Search at the age of 17, earned undergraduate and Ph. D. degrees from Harvard and taught at Princeton and MIT before being named a full professor of theoretical physics at her alma mater in 2001. She entered a branch of science where 90 percent of the professors are male, and has emerged as one of the world's leading particle physics thinkers.

Randall, who served on a Women in Science and Engineering task force that seeks to improve the climate for women in science at Harvard, was the first tenured woman professor in Princeton's physics department and was the first tenured woman theorist in science at both MIT and Harvard.

Randall says her fifth-dimension insight came about while bouncing ideas off then-BU postdoctoral researcher and now Johns Hopkins professor Raman Sundrum on how to explain one of physics' biggest conundrums: why gravity is so much weaker than the universe's other forces. Gravity is so weak on our planet's surface that a small magnet can hold something like a paper clip even as the gravity of the entire earth is pulling it down.

Lisa Randall has become a star in the rarefied world of high- energy physics, and her theory about a "fifth dimension" has caught the imagination of the general public too.

That doesn't mean she still isn't shy and a little nervous about all the hoopla.

"I really like that my work is getting more people interested in science," says the 43-year old Harvard physicist. "And while it can get a little nerve-wracking dealing with all the attention, I really enjoy speaking to the public and answering questions."

Randall seems constantly in motion.

She seldom sits still, and says her mind brims with ideas - and what mind-boggling ones they are.

Her theory of a fifth, unseen dimension that affects the three- dimensional world we inhabit (The fourth dimension is time.) may well turn our conception of the universe on its head.

Randall's equations apparently work, and if physical evidence from this dimension is found in tests on Switzerland's Large Hadron Collider - a powerful machine that crashes together and records the movement of the universe's tiniest particles - Randall is said to be a shoe-in for a Nobel Prize.

Now she has published a book called "Warped Passages: Unraveling the Mysteries of the Universe's Hidden Dimensions"

Written for the lay reader, "Warped Passages" is receiving wide acclaim.

It has led to public speaking engagements before big crowds at the Smithsonian and New York's Hayden Planetarium, and scads of newspaper, radio, TV and magazine interviews.

Tomorrow night Randall will give a free talk at Boston's Museum of Science.

"I tried to have fun and be playful in the book while also introducing a lot of serious science," she says.

Randall, who lives in Cambridge, covers a lot of ground in "Warped Passages" - from the theory of relativity, through quantum mechanics (explaining the nature of light) to string theory (that posits vibrating strings as the universe's fundamental matter) right up to recent developments that include her own work.

"It makes me happy when people say they feel a sense of accomplishment after reading it," says Randall, who spent three years writing the book while continuing her research and teaching.

There have been other theories of extra dimensions, but Randall's are unique. She thinks this new dimension could be infinite in size- not super-tiny and curled up, as others have proposed. The fifth dimension she theorizes occupies a separate flat "brane," or membrane, parallel to the world we experience. What has excited physicists is that her theory will be testable when the new accelerator opens just two years from now.

"She's an outstanding, well-regarded theorist who's raised some interesting ideas about what's out there," says her former colleague and MIT physicist Gerome Friedman, who himself won a Nobel Prize in Physics in 1990 for co-discovering elemental particles called quarks. "If we see evidence of what she's proposed, it will be extraordinary. It will shake up everything."

The theory is an incredible achievement for the middle of three daughters of a Queens engineering-firm salesman.

A young math whiz, Randall tied for first place in the National Westinghouse Science Talent Search at the age of 17, earned undergraduate and Ph. D. degrees from Harvard and taught at Princeton and MIT before being named a full professor of theoretical physics at her alma mater in 2001. She entered a branch of science where 90 percent of the professors are male, and has emerged as one of the world's leading particle physics thinkers.

It hasn't gone unnoticed that Randall continues to achieve at a time when Harvard President Larry Summers has been under fire for remarks he made earlier this year suggesting that innate differences in ability between men and women in math and science may help explain the lack of top-level females in the profession.

"I was surprised by his remarks," Randall says. "He made a generalization

based on inadequate knowledge of the literature on the subject."

She adds that Summers - who came to Harvard the same year she became a professor there - has always been interested in her work and is reading her book now.

Randall, who served on a Women in Science and Engineering task force that seeks to improve the climate for women in science at Harvard, was the first tenured woman professor in Princeton's physics department and was the first tenured woman theorist in science at both MIT and Harvard.

But despite her achievements, Randall says the "women in science" question is a sensitive issue for her. She sees herself as a physicist first, but also realizes that her growing prominence has made her a high-profile role model for women.

"My primary reason for writing the book was to help the public better understand the complex science of particle physics," she says. "But a side benefit was to show that there are women out there doing this. I've had enthusiastic responses from both men and women."

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The equations she developed to solve the problem pointed to a geometrically warped fifth dimension we can't see, where gravity is a strong force transmitting graviton particles to our three- dimensional space. It isn't that far-fetched. After all, we can't see our fourth dimension, time, yet we clearly experience it.

"The extra-dimension thing has really piqued people's interest," says Randall. "What makes me different as a scientist is that I'm kind of imaginative. The ideas just happen."