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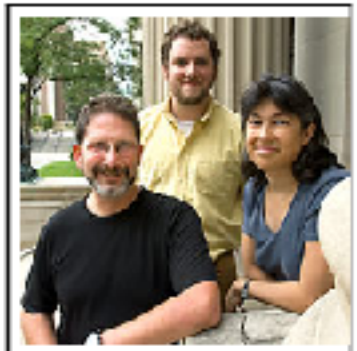
Researchers find absolutely nothing

UNIVERSITY ASTRONOMERS DISCOVER GREAT GAPING GASH IN THE HEAVENS

By Deane Morrison

August 28, 2007

Nothing fascinates Lawrence Rudnick. In fact, the University astronomy professor even teaches a freshman seminar on the concept of nothingness, titled simply "Nothing." But he never expected to discover the biggest nothing of all.



Astronomers Lawrence Rudnick, Shea Brown, and Liliya Williams made waves when they found a gigantic gaping hole in the Universe.

Photo and home page image by Patrick O'Leary

Last week Rudnick, along with graduate student Shea Brown and associate professor Liliya Williams, announced the discovery of a void in the Universe a thousand times bigger than any previously found. Empty of stars, planets, galaxies, black holes and even the mysterious, invisible "dark matter," a region so big it would take a light beam a billion years to cross.

But it took the world about a billionth of a second to take notice of the find. The discovery hit front pages across the country and abroad, catapulting the three astronomers to sudden fame. It also brought a deluge of e-mails.

"I got e-mails from everywhere from Sao Paulo to Iraq, plus several people who wanted to know if they're my relatives," says Rudnick.

Contemplating the void

The newly found empty space occupies a sizable chunk of the visible Universe, Rudnick says. That's the relative space a 1 cubic foot box would occupy in a living room 20 feet by 30 feet by 10

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feet. The Universe was thought to have a much more even distribution of stars, galaxies, clusters of galaxies and the mysterious "dark matter" that forms 85 percent of the matter in the Universe but emits no light.

The void was found in the constellation Eridanus--representing an ancient river--to the southwest of Orion. It can't be seen with the human eye because it's between six billion and 10 billion light-years distant, and the stars of our Milky Way galaxy fill the visible sky in front of it. But if you could see it, it would be huge. It covers an area of the sky about three degrees in diameter, approximately 40 times the area covered by the full moon, say the researchers.

"It's really strange there is such an empty region," says Marco Peloso, assistant professor of physics at the University. "How do you explain this? It was quite a surprise."

The void lies in a direction almost opposite to that of the center of our galaxy. If you were to turn your back to the galactic center--found in Sagittarius, a summer constellation--and then turn 30 degrees to the left, you would be facing the general direction of the void.

Worry about nothing

The researchers found the void using data on the distribution of matter in the Universe supplied by the National Radio Astronomy Observatory from its array of telescopes in New Mexico. But that is a public database, a fact that led to some down-to-earth concerns.

"We were worried about being scooped," Rudnick admits. "Our data were available publicly. Anybody could have found what we found."

"It was low-hanging fruit," adds Williams.

To beat the competition, Williams spent an entire night analyzing data to make sure their interpretation was correct so that the work would be ready to submit for publication the next morning.

What nothing means

If the existence and size of the void is confirmed, it will give theoretical astrophysicists plenty to chew on.

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"It could just be the first [of its kind to be discovered]," muses Rudnick. Nobody else, he says, has searched for voids using the data his team used.

No doubt the void will also figure into Rudnick's freshman seminar, which he will next offer in the spring.

"Exploring nothing is extremely fertile ground," he says. "When students are forced to confront nothing it stretches their minds and challenges them in ways they haven't experienced before. For example, a number of students have looked at or questioned the idea of beliefs. What if your own beliefs or other peoples' are based on nothing that has external reality? How do we know what's real and true?"

The void is a showcase for the power of dark energy, the recently discovered force that is causing the Universe to speed up its expansion. To learn why, see Cosmic journey.