Giant Camera Will Hunt For Signs Of Dark Energy

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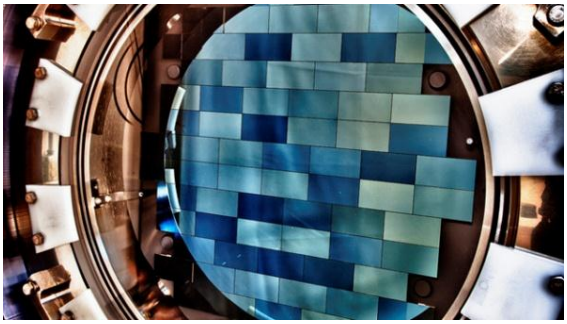

Reidar Hahn/Fermilab →

A look inside the Dark Energy Camera shows the 74 blue-tinged sensors that detect light. The camera will survey distant, faint galaxies to learn more about dark energy.

A giant and powerful digital camera is about to be shipped from a lab near Chicago to a telescope in Chile to study a mysterious part of the universe called dark energy.

Dark energy makes up most of our universe, but scientists currently know almost nothing about it except that it seems to be making the expansion of our universe speed up.

Workers test the fitting of the camera on a simulator device at Fermilab, outside Chicago. The camera will be installed on the Blanco telescope high in the Chilean mountains.

Cindy Arnold/Fermilab
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"There's enough data that people know what we don't understand, but there's not enough data to explain it yet," says Brenna Flaugher, a physicist at Fermilab near Chicago, which assembled the Dark Energy Camera. "There's too much room for the theorists to come up with crazy ideas right now. And so there's lots of crazy ideas. And we need data." That's where this new 570-megapixel camera comes in. Flaugher says its basic technology would be familiar to anyone who uses a digital point-and-shoot. "The camera that we built is really very similar to the digital cameras you can buy at Walmart or wherever," she says.

But this camera is big — its guts fill a shiny cylinder that's about the size of a car engine. "This thing weighs almost a ton," says Flaugher.
And the lenses are huge and heavy, too — with the largest lens about 3 feet across. This camera is also incredibly sensitive.

After it's mounted on the Blanco 4-meter telescope, high in the Chilean mountains, later this year, the camera will survey a large part of the sky for faint galaxies at the distant reaches of our universe.

By studying these galaxies, scientists hope to learn more about dark energy. "I think this probably is the first camera that's been designed just to do dark energy," says Flaugher.

Understanding Dark Energy

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- Brenna Flaugher, physicist, Fermilab

Dark energy was discovered only recently. In 1998, two different research teams saw the first evidence for it as they looked at the light coming to Earth from exploding stars in faraway galaxies.

"What we were really measuring was how far away the galaxies were, and they were much farther away than they should be, just based on gravitation," says Nicholas Suntzeff, an astronomer at Texas A&M University. This meant something was acting against gravity. It's as if you threw a rock up in the air and instead of slowing down and coming back, the rock kept shooting up faster and faster, says Suntzeff.

"You'd think that would be really weird," he says. "That's antigravity. Well, the same thing happened with the galaxies." As galaxies move apart from each other, they are speeding up, going faster and faster instead of slowing down.

Researchers Find New Evidence Of Dark Energy Dec. 16, 2008

Suntzeff says it seems as though space itself has a natural ability to push away all other space around it. "That's what the equations are saying, that every piece of space, it's like it doesn't like anything else around it," he explains. "It's constantly pushing everything away."

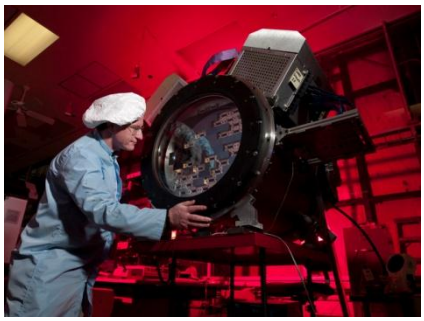
As it does that, new space is created in between, Suntzeff says, "but that new space that's created will see the other pieces of space and then push on that, which makes it a process which goes faster and faster and faster."

'A Disturbing Idea'

This means the universe is not only expanding — that expansion is speeding up. Suntzeff says it seems that the universe is flying apart, and galaxies will ultimately disappear in the sky — everything will go cold and dark.

"That's a disturbing idea, both philosophically and theologically," Suntzeff says, noting that the world's religions hold that things either renovate themselves or go to some place with eternal life.

It's a challenging idea for science, too. Suntzeff recently served on an expert task force established to advise the government on future needs for dark energy research. It concluded that so far, science hasn't come up with any good explanations for why dark energy exists, and it recommended "an ambitious observational program to determine the dark energy properties as well as possible."



Reidar Hahn/Fermilab

Fermilab scientist Tom Diehl works on the heart of the Dark Energy Camera.

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No one can photograph dark energy itself. But Flaugher says the new camera will look for the effects of dark energy by gathering data on more than 300 million galaxies whose faint light has been traveling toward Earth for a very long time.

"With this camera we'll be able to go back about 6, 7 billion years, so about three-quarters to half-way back to the Big Bang," she says.

This will let researchers look back at how the universe has been expanding in the past, and see how dark energy may shape the universe's future.