Out Of Antarctica, A 'Grand Slam' That Leads Back To The Big Bang

by **GEOFF BRUMFIEL**

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Physicists using data from an Antarctica telescope say they've observed evidence of primordial gravity waves — in other words, echoes of the Big Bang. If real, this may be a big advance for physics.

AUDIE CORNISH, HOST:

From NPR News, this is ALL THINGS CONSIDERED. I'm Audie Cornish.

ROBERT SIEGEL, HOST:

And I'm Robert Siegel.

Today, our reporters in Ukraine, Washington and London are following events in and about Crimea.

CORNISH: But first, physicists announced today that they've seen a signal from the very first moments after the big bang. If that's confirmed it may help scientists to answer some of the most fundamental questions about our existence.

And joining me is NPR science correspondent Geoff Brumfiel. Geoff, welcome.

GEOFF BRUMFIEL, BYLINE: Hi there.

CORNISH: Alright, big questions about our existence. Just how big is today's announcement?

BRUMFIEL: Well, I'd like to let one of the scientists answer that. Marc Kamionkowski is a cosmologist, somebody who studies the very birth of the universe. He's at Johns Hopkins University and here's how he described today's announcement.

MARC KAMIONKOWSKI: This is cosmology's missing link and it has been eagerly sought now for close to two decades. This is not something that's just a home run but a grand slam.

BRUMFIEL: And right after that he went on to call it a smoking gun. So all those mixed metaphors should give you a sense of just how excited they are.

(LAUGHTER)

CORNISH: What is it that researchers could actually see?

BRUMFIEL: Well, the researchers were using a telescope in Antarctica to study something called the cosmic microwave background. That's the very faint afterglow of the big bang. And they were looking for an even fainter signal in the background, a signal that came from a trillionth of a trillionth of a trillionth of a second after the universe started. And they think they found it.

CORNISH: What does that mean?

BRUMFIEL: They think that the signal was created by gravitational waves. These are ripples in the fabric of space itself. And these ripples are predicted by a theory called inflation. This theory basically says there was a period of very, very rapid outward accelerating expansion in the universe just after the big bang. The universe went from the size of a like a nucleus to the size of the universe we see today. And studying these waves could tell us more about that period, and it could tell us even more about the

very nature of the universe around us.

CORNISH: What else could they learn?

BRUMFIEL: Well, there's this huge problem in physics right now. We have a theory of the very small things, which is quantum mechanics. And then we have this theory of the very large, of gravity and galaxies and things like that, that's Einstein's theory. The problem is that we have no way to make the large theory of gravity fits with the small theory of quantum mechanics.

Now, these gravitational ripples, they were created at a time when the universe was very, very tiny and obeyed the rules of quantum mechanics. But they exist in this larger universe of gravity. And so there's hope that further studies of these ripples could help us bring these two theories together.

It could do even more. I heard one physicist today say that this discovery could hint at multiple universes.

CORNISH: Now, this discovery sounds like it could deserve a Nobel Prize, right? I mean if it's as big as they're saying.

BRUMFIEL: Yah, I think may be why the people involved sort of rushed out with a big press conference today. There are competing experiments. But I should sound a word of caution here: not everyone is entirely convinced. I spoke to one of the founders of this theory about the rapid expansion. His name was Paul Steinhardt. And he said that he wanted to see more evidence before he'd be completely convinced that this signal was real.

CORNISH: NPR's science correspondent Geoff Brumfiel, thanks so much.

BRUMFIEL: Thank you.