



"Long before it's in the papers"

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“Inflation” theory of infant cosmos may need revision

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Courtesy of the Kavli Foundation
and World Science staff

The most detailed map of the early universe ever devised by people—released this spring—is renewing questions among many physicists about what happened in that distant past.

At issue is the prevailing “inflation” model of the universe, which holds that the universe briefly underwent an incredible burst of expansion just after the Big Bang, the explosion-like event believed to have started it all.

The new map, generated by observations from the European Space Agency’s Planck spacecraft, revealed fluctuations in temperature of radiation left over from the Big Bang. This radiation, detectable across the whole sky, is known as the Cosmic Microwave Background.

Planck mission scientists have been puzzled by some hard-to-explain features in this background light, including a large cold spot. This spot points to a huge area of high density, or compactness of material.

The spot is too large to neatly fit the inflation model, some scientists say. The Kavli Foundation, based in Oxnard, Calif., this week released a transcript of a roundtable that it had held with three key members on the team. One important question: Will the theory for how the universe began need to be modified, amended or even fundamentally changed?

“Perhaps our theory of inflation is not correct, despite its beauty and simplicity,” said George Efstathiou, an astrophysicist at the University of Cambridge and director of the Kavli Institute for Cosmology at Cambridge.

American physicist Alan Guth is credited with first proposing the inflation model, in 1980.

The theory “predicts that today’s universe should appear uniform at the largest scales in all directions,” he explained. “That uniformity should also characterize the distribution of fluctuations at the largest scales,” he added. “But these anomalies, which Planck confirmed, such as the cold spot, suggest that this isn’t the case.”

“This is very strange,” added Efstathiou, who has been involved in the Planck mission since it was proposed in 1993. “And I think that if there really is anything to this, you have to question how that fits in with inflation.... It’s really puzzling.”

“Inflation actually may have been more limited in scope than previously theorized,” said Anthony Lasenby, an astrophysicist at Cambridge and deputy director of the institute.

Some physicists have proposed that features such as the cold spot may also signify that other universes bumped into our own.

Krzysztof Gorski, a Planck Collaboration scientist and senior research scientist at the Jet Propulsion Laboratory in Pasadena, Calif., told the roundtable that “perhaps we may still eliminate these anomalies with more precise analysis; on the other hand, they may open the door to something much more grand—a reinvestigation of how the whole structure of the universe should be.”

The scientists also plan to answer questions from the public during a live “Google Hangout” July 31 at noon Pacific time.