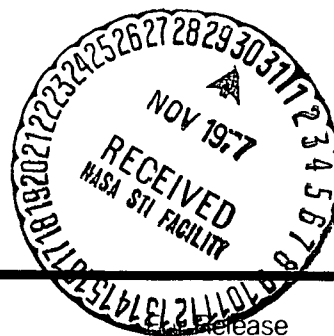


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Nicholas Panagakos
Headquarters, Washington, D.C.
(Phone: 202/755-3680)

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Peter Waller
Ames Research Center, Mountain View, Calif.
(Phone: 415/965-5091)

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THE BEGINNING: SERENE PROCESS OR CHAOTIC BANG?

Was the Big Bang explosion that marked the beginning of our universe violent and chaotic?

Many scientists think so.

But measurements made recently by a team of researchers using a high flying NASA aircraft suggest that our cosmos may have started more serenely -- with a powerful but tightly controlled and completely uniform expansion.

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SERVE PROCESS OR CHAOTIC BANG (National
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Using ultrasensitive radio equipment aboard an Ames Research Center U-2 jet, the research team measured the cosmic microwave background--the radiation left over from the Big Bang, the initial, universe-forming event--and concluded that this initial event was a very smooth, almost serene process, with matter and energy uniformly distributed and expanding at an equal rate in all directions.

The findings were made by Drs. Richard Muller, George Smoot and graduate student Marc Gorenstein of the Lawrence Berkeley Laboratory and the University of California at Berkeley, who also designed and operated the radio equipment.

They also found that the Milky Way Galaxy, together with the solar system and Earth, appears to be hurtling through space at more than one million miles per hour towards the constellation Hydra.

"The radiation left over from the universe-forming event about 15 billion years ago is so uniform that it provides a universal reference for measuring this motion," says Gorenstein.

"Another major surprise is that the U-2 measurements seem to show that there is no rotation of the universe," says Smoot. "This is surprising because we can see that everything within the universe is rotating--planets, stars, and galaxies. If there is rotation, it has to be less than one hundred millionth of a rotation in the last billion years."

"Our measurements give a picture of an extremely smooth process," declare the researchers. "The big bang, the most cataclysmic event we can imagine, on closer inspection appears finely orchestrated. Either conditions before the beginning were very regular, or processes we don't yet know about worked to make the universe extremely uniform."

The uniformity was greater than one part in 1,000 for matter, one part in 3,000 for energy, and one part in 10,000 for expansion.

According to the currently accepted "big bang" picture, the universe began as a hot, incredibly dense mass containing all the matter in the universe. At a certain "initial" instant, the primeval fireball exploded in the vastest cataclysm imaginable.

As the universe continued its expansion and the temperature dropped, protons and neutrons began to fuse into nuclei and remained fused for increasingly longer periods of time. They formed first hydrogen, then deuterium and later helium. After millions of years, the material had cooled sufficiently to condense into galaxies and within the galaxies into stars and planets. As a consequence of the colossal explosion, the galaxies have continued to separate from each other, and thus form the expanding universe we observe. Those galaxies farthest from Earth appear to be traveling the fastest.

"The large scale regularity we have found in the expansion of the universe makes the million-mile-an-hour random local motion we have detected for the Earth and our galaxy all the more surprising," Smoot says.

The U-2 plane, at an altitude of 19,800 meters (65,000 feet), flies above 90 per cent of the Earth's atmosphere where these sensitive experiments must be conducted. In charge of the flights for Ames Center was James Cherbonneau, U-2 Project Manager. When it is not investigating the cosmos, the U-2 jet is used for agricultural and Earth resources photography.

The project was funded by the Department of Energy and NASA. Measurements so far have covered almost the entire sky over the northern hemisphere, half the celestial sphere.

An illustration to accompany this news release will be distributed without charge only to media representatives in the United States. It may be obtained by writing or phoning:

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SCHEMATIC VIEW OF OUR SECTOR OF THE UNIVERSE

