Hubble Finally Gets a Heavenly View

Hubble's troubles are over.

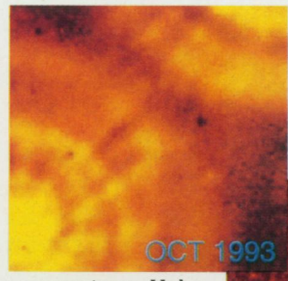
For three and a half years, a tiny optical flaw had clouded the vision of the $2 billion Hubble Space Telescope and become a symbol of mismanagement at NASA. But last week, jubilant space agency officials and scientists announced that the telescope's blurry vision — as well as several mechanical difficulties — were a thing of the past. According to Hubble project scientist Edward J. Weiler, repairs made by astronauts last month have corrected the spherical aberration in Hubble's primary mirror, making the telescope the world-class observatory astronomers had always hoped for. Scientists announced the findings during a crowded press conference at NASA's Goddard Space Flight Center in Greenbelt, Md.

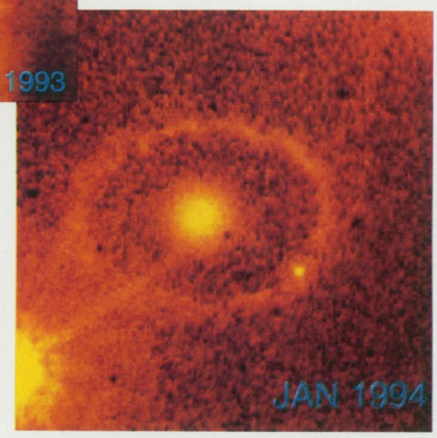
Researchers said they cheered and toasted with champagne the test images taken in late December and early January with the repaired Hubble's two cameras. The images "are about as close to perfection as engineering can achieve and the laws of physics will allow," said James H. Crocker of the Space Telescope Science Institute in Baltimore. The new optics will allow Hubble to see details in distant galaxies that it could only see previously in bodies 10 times closer to Earth, says Jon A. Holtzman of Lowell Observatory in Flagstaff, Ariz.

The telescope's sharper vision will enable astronomers to image Cepheid variable stars, which serve as cosmic mile-markers, in galaxies more distant from Earth, providing a better estimate of the size and age of the universe, he says. If the repairs for Hubble's two spectrometers also prove successful, the telescope will have a better chance of determining which galaxies harbor a black hole.

Hubble's spherical aberration had smeared incoming light, preventing the telescope from clearly viewing faint galaxies or distinguishing individual stars in crowded clusters. The flaw also created halos of light around bright objects, washing out detail from their surroundings. Before the repairs, the telescope could only focus about 12 percent of light from celestial objects — far less than its design goal — into a radius of 0.1 arc second. In comparison, Hubble's new Wide-Field and Planetary Camera, which has built-in optics to correct for the telescope's optical flaw, focuses 60 to 70 percent of light into a circle of that radius, says Hubble senior scientist David S. Leckrone of Goddard Space Flight Center. A set of mirrors inserted into the light path of the telescope's Faint Object Camera sweeps 85 percent of available light into the same tight focus. The extra mirrors, however, reduce by 20 to 30 percent the amount of light reaching the camera, he adds. —*R. Cowen*

In an ultraviolet image (left) taken by Hubble's Faint Object Camera before the repairs, light from a bright star washed out detail from supernova 1987A, the shell of hot gas ejected from an exploded star. In the new image (below), light from the nearby star no longer spills over into the rest of the frame, revealing the supernova's spherical fireball.





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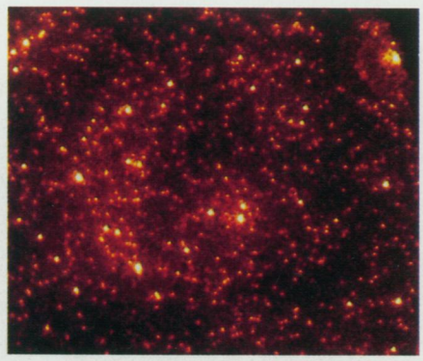
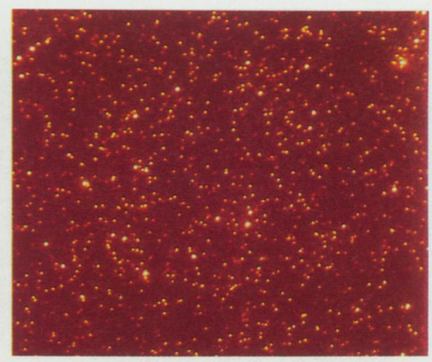
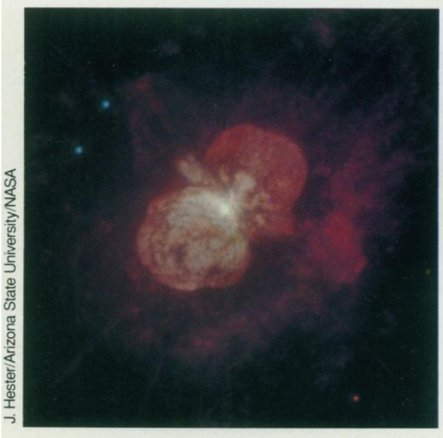
Fuzzy view of the core of the galaxy M100 (left), taken with the old Wide-Field and Planetary Camera, gives way to a sharper image with the new camera (right).





Robert Jedrzejewski/ESA/NASA

Above: Before the repair, the Faint Object Camera recorded a blurry view (left) of the star-packed region 47 Tucanae. The new image (right) reveals for the first time in such a globular cluster faint stars that may be white dwarfs. Left: A new Wide-Field and Planetary Camera image of the star Eta Carinae shows that a jet of material sprays out along the plane between two lobes of ejected gas and dust, rather than out the poles of the system, as an earlier image had suggested.



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