Hubble Mirror with NASA Scientists

Shortly after the Hubble Space Telescope was deployed, in 1990, scientists realized there was something wrong with her mirror. (This image depicts Hubble's mirror before the orbiting telescope began her space journey.)

What was wrong?

The mirror had a slight aberration which caused Hubble's pictures to appear blurred.

A Space Shuttle mission (STS-61) also became Servicing Mission 1 (SM1) as astronauts aboard *Endeavour* corrected Hubble's blurry-vision problem.

What was the exact nature of the problem which Hubble's team (on Earth) and *Endeavour's* team (in space) had to correct? NASA describes the mirror's flaw:

> *After Hubble's deployment in 1990, scientist realized that the telescope's primary mirror had a flaw called spherical aberration. The outer edge of the mirror was ground too flat by a depth of 2.2 microns (roughly equal to one-fiftieth the thickness of a human hair).*
>
> *This aberration resulted in images that were fuzzy because some of the light from the objects being studied was being scattered.*

How did scientists repair the flaw?

> *COSTAR (the Corrective Optics Space Telescope Axial Replacement) was developed as an effective means of countering the effects of the flawed shape of the mirror. COSTAR was a telephone booth-sized instrument which placed 5 pairs of corrective mirrors, some as small as a nickel coin, in front of the Faint Object Camera, the Faint Object Spectrograph and the Goddard High Resolution Spectrograph.*

In addition, *Endeavour's* astronauts installed Wide Field Planetary Camera 2 (WFPC2) which significantly helped Hubble's performance:

> *WFPC2 significantly improved ultraviolet performance over WFPC1, the original instrument. In addition to having more advanced detectors and more stringent contamination control, it also incorporated built-in corrective optics.*

Click on the image for a better view of Hubble's mirror.

Credits:

NASA image; online, courtesy NASA.

All quoted passages from "The Hubble Space Telescope," a NASA website, specifically the page on SM1, the first Hubble-repair mission.

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