



# THE STAR WITNESS



A PUBLICATION OF NASA'S "AMAZING SPACE" EDUCATION PROGRAM

## Special Feature

# Birthday Wishes for Hubble

By NASA's Amazing Space reporters  
April 2007

**A**STRONOMERS ARE placing another candle on Hubble's birthday cake. The Earth-orbiting telescope is celebrating its 17th birthday, making it a mere teenager. This teenager, however, has produced some breathtaking images of celestial objects and has helped astronomers answer many important questions about our universe.

### A great observatory

NASA launched the Earth-orbiting telescope on April 24, 1990, when George W. Bush's father was president and the World Wide Web was still a dream. In its 17 years of exploring the heavens, the telescope has snapped nearly 500,000 images of more than 25,000 celestial objects. It has made nearly 100,000 trips around Earth. Those trips have racked up lots of frequent-flier-miles — more than 2.4 billion, the equivalent of a round trip to Saturn.

Hubble's 17 years of observations have produced more than 30 terabytes of

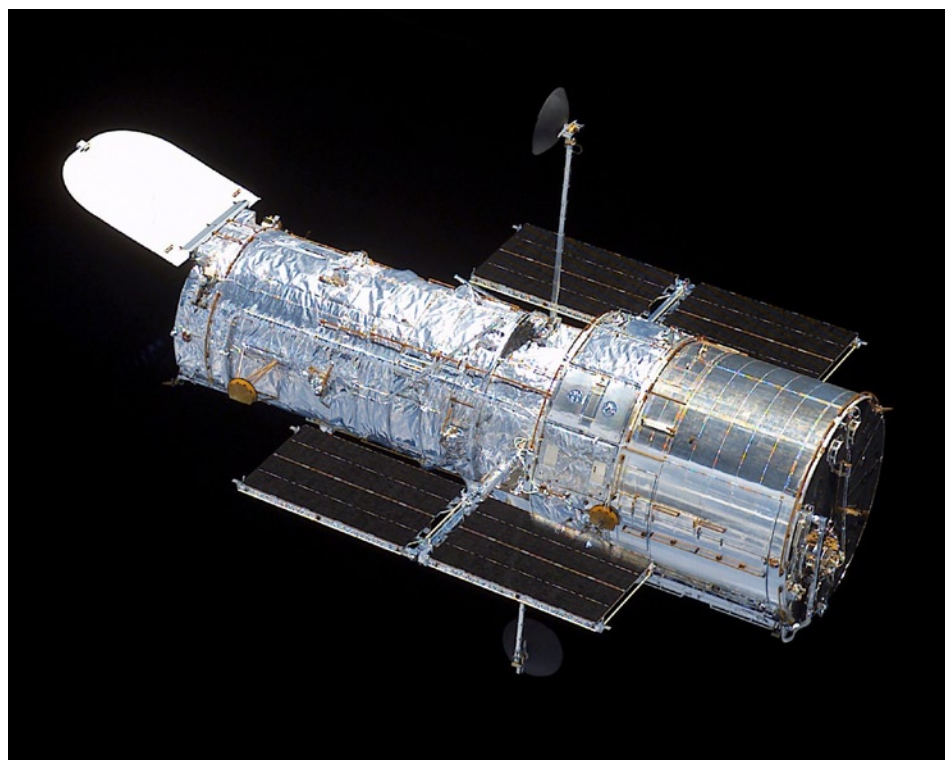


IMAGE: NASA

**The Hubble Space Telescope** sporting its new solar panels, installed during a servicing mission in 2002. The telescope orbits 380 miles above Earth. Launched on April 24, 1990, the observatory has been observing the cosmos for 17 years.

data, equal to about 25 percent of the information stored in the Library of Congress. Each day the orbiting observatory generates about 10 gigabytes of data, enough information

to fill the hard drive of a typical home computer in two weeks.

*Continued, page 2...*

# Hubble's birthday gift to the public: The Carina Nebula



IMAGE: NASA, ESA, N. Smith (University of California, Berkeley), and The Hubble Heritage Team (STScI/AURA)

**The Carina Nebula** contains several stars that are among the hottest and most massive known. Each star is about 10 times as hot and 100 times as massive as our Sun. The energy produced by these stars is sculpting the nearby gas and setting off the formation of a new generation of stars.

*Continued from page 1...*

The Hubble archive sends about 66 gigabytes of information each day to astronomers throughout the world. Astronomers using Hubble data have published nearly 7,000 scientific papers, making it one of the most productive scientific instruments ever built.

## **Hubble's birthday gift to the public**

To celebrate Hubble's 17th birthday, NASA and the Space Telescope Science Institute are releasing an image of the Carina Nebula, a 3-million-year-old gigantic cloud of gas. The gaseous cloud is a busy star-making factory that is churning out tens of thousands of stars. Peeking inside the star-making factory, the Hubble Space Telescope

offers a dramatic glimpse of a fairytale landscape of dust and gas that is being sculpted by energetic young stars.

## **Looking near and far**

This jaw-dropping image is just the latest of Hubble's many accomplishments. During its 17 years in space, Hubble looked close to home at our solar system planets, gazed far across space to see galaxies in their infancy, provided decisive evidence for the existence of giant black holes, and detected an invisible force that makes up the bulk of the energy in our universe.

## **Planets, planets everywhere**

In our solar system neighborhood, the telescope witnessed pieces of a broken-up comet smash into Jupiter, giving the planet several

"black eyes." Hubble also spied two new moons orbiting Pluto.

Peering at stars near the center of our Milky Way Galaxy, Hubble conducted a census of Jupiter-sized planets. The telescope found 16 alien worlds, suggesting that there may be billions of Jupiter-sized planets in our galaxy.

## **Witnessing stellar death**

Turning its gaze to aging stars, Hubble took snapshots of the "last hurrahs" of Sun-like stars. As ordinary stars begin to die, they shed their outer layers of gas and glow as planetary nebulae. The telescope also watched the aftermath of a supernova, the explosive death of a massive star (see images, page 3). The Hubble observations of Supernova 1987A helped astronomers rewrite the textbooks on exploding stars.

*Continued, page 3...*

## Galaxies give up their secrets

Hubble helped astronomers calculate a precise age for the universe by measuring the distances to many galaxies. Astronomers now think the cosmos is about 13.7 billion years old.

Galaxies are everywhere in space, but Hubble looked far across our cosmos to see their building blocks. The Hubble observations provided solid evidence that galaxies grew over time to become the giant galaxies we see today.

Peering into the hearts of galaxies, Hubble provided decisive evidence that supermassive black holes reside in many of them. These “eating machines” gobble up any material that

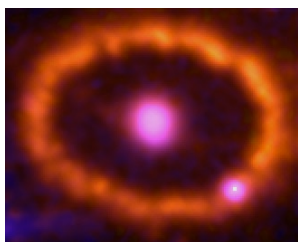
ventures near them. Black holes cannot be seen directly because no material, including light, escapes their grasp.

## Shedding light on dark energy

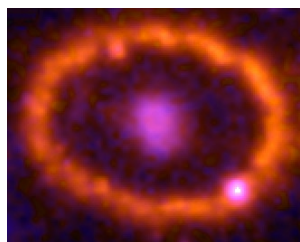
By witnessing bursts of light from faraway exploding stars, Hubble helped astronomers discover that a mysterious, invisible force called dark energy exists. The observations show that dark energy is making the universe expand at an ever-faster pace. Physicist Albert Einstein predicted its existence early last century, but he later said that his prediction was the biggest mistake of his career. Now, astronomers are proving that Einstein may have been right.

Although teenage Hubble has accomplished so much during its 17 years in space, its best scientific discoveries are yet to come. NASA is planning another servicing mission to keep Hubble operating for a few more years. Servicing mission astronauts will install two brand new science instruments that will allow Hubble to probe even farther into space. Who knows what secrets the telescope may uncover. ★

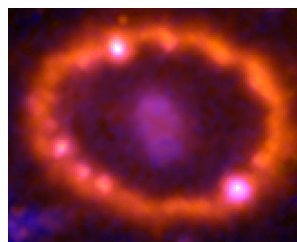
## Hubble monitors a supernova light show



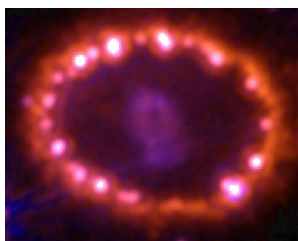
1994



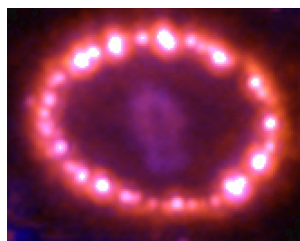
1998



2001



2003



2004

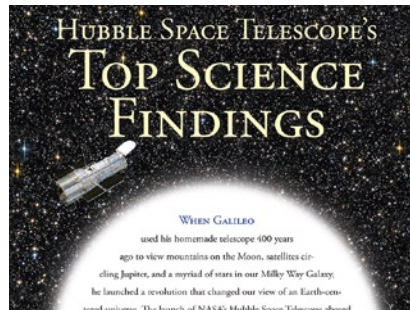


2006

The Hubble telescope has taken many pictures over its lifetime of the tattered remains of an exploded star, called Supernova 1987A. Astronomers first spotted the stellar blast 20 years ago, in 1987. These six Hubble snapshots, taken over several years, show a growing number of bright spots on a ring of material around the exploded star. Debris from the supernova is slamming into the ring and lighting it up.

IMAGES: NASA, ESA, P. Challis and R. Kirshner (Harvard-Smithsonian Center for Astrophysics)

## Hubble's Top Science (PDF)



READ MORE and see the pictures that accompany Hubble's top scientific findings after 17 years in orbit.

Download the PDF from

**[amazing-space.stsci.edu/  
news/archive/2007/02/  
extra-03.php](http://amazing-space.stsci.edu/news/archive/2007/02/extra-03.php)**

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