Astronomers' toy box overflows

New telescopes herald unheard-of discoveries in '09

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WASHINGTON — Astronomers this year are about to get a windfall of new and improved telescopes of unprecedented power with which to explore the universe.

The bonanza arrives 400 years after Galileo spied craters on the moon through the world's first telescope.

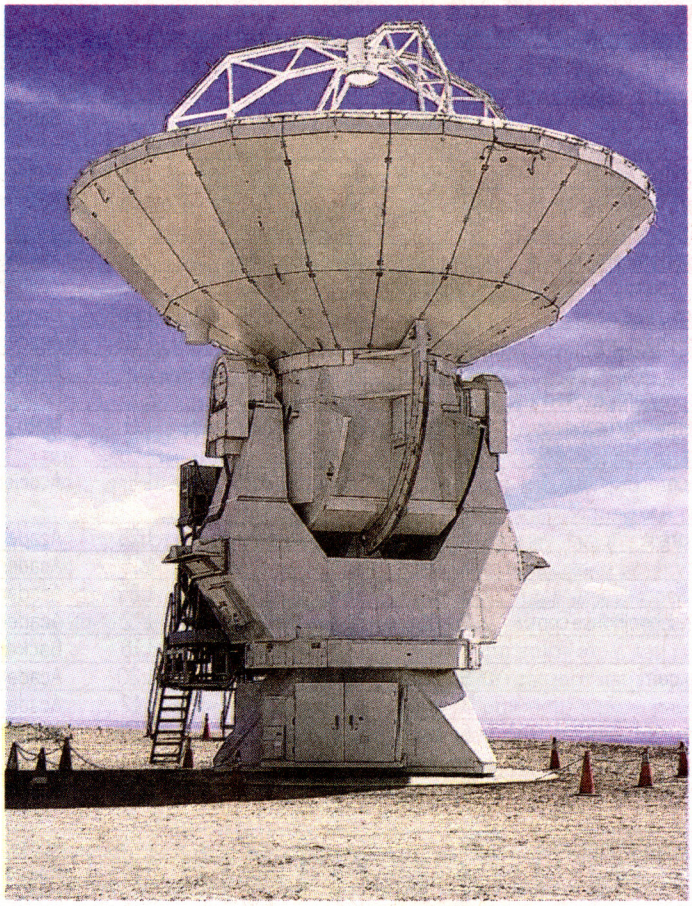
Instruments coming on line in 2009 will let researchers see farther and more clearly than ever — perhaps even detect an asteroid swooping dangerously close to Earth or signs of life on another planet.

The telescopes will open new windows on the heavens by using different technologies and different wavelengths of light. They'll be able to see things in the far ranges of ultraviolet, infrared or radio waves that are invisible in the narrow band of optical light.

"This year's going to be huge," said Julianne Dalcanton, an astronomer at the University of Washington in Seattle. "The new capabilities are going to be absolutely fabulous."

The International Astronomical Union, an organization of about 10,000 professional astronomers, has named 2009 the International Year of Astronomy. That's in honor of Galileo, who was accused of heresy by the Vatican for insisting that the Earth moves around the sun.

"In 2009, we would like everybody on Earth to think at least once about the wonders of the universe," said IAU President Catherine Cesarsky, a French astrophysicist.



COURTESY OF NATIONAL RADIO ASTRONOMY OBSERVATORY

This is the first of 50 giant antennas that will be placed in Chile's Atacama Desert to study radiation from the far corners of the universe.

Among telescopes projects under way in 2009 are:

- A major upgrade of the 19-year-old Hubble Space Telescope, including two advanced detectors that will vastly improve its vision for another five years.
- A bigger European rival to Hubble called the Herschel Space Observatory.
- ALMA (Atacama Large Millimeter/submillimeter Array, a series of 50-plus telescopes in a lofty desert in Chile that will be the most powerful ground-based observation system to date.
- Kepler, an orbiting telescope designed specifically to look for inhabitable planets around distant stars.
- Pan-STARRS, a set of four interconnected telescopes to detect fast-moving hazardous objects, such as satellites or space rocks.
- IceCube, an upside-down space-particle observatory buried under the ice at the South Pole.
- The Allen Telescope Array, a set of 42 of radio telescopes listening for extraterrestrial messages from possible civilizations around another star.

Waiting for future financing are even larger, more powerful machines, including two giant telescopes with light-collecting mirrors three to four times as big as those on existing telescopes.

Another ground-based instrument, the Large Synoptic Survey Telescope (LSST) will take about 1,000 images of each spot in the entire sky over its lifetime. Taken together, the repeated images will produce color movies of celestial objects as they change or move, including potentially hazardous asteroids.

The James Webb Space Telescope, NASA's successor to Hubble, is under construction and scheduled for launch in 2013. Its main mirror, 21 feet in diameter, has to be folded up to fit in the launch vehicle, along with a sunshield that opens up to the size of a tennis court. The instrument will orbit almost a million miles from Earth, where it will study the first stars and galaxies formed after the birth of the universe.

ON THE WEB

For more on the International Year of Astronomy:
www.astronomy2009.org
The Hubble Space Telescope:
hubble.nasa.gov
The Kepler Mission:
kepler.nasa.gov

The Herschel Space Observatory: sci.esa.int/science-e/www/area/index.cfm?fareaid=16

The Pan-STARRS project:
pan-starrs.ifa.hawaii.edu/public

The Allen Telescope Array:
www.seti.org/Page.aspx?pid503

The IceCube Neutrino Observatory: icecube.wisc.edu
ALMA: almaobservatory.org

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