Spitzer Turns Five

On August 25, 2003, NASA launched the Spitzer Space Telescope from Cape Canaveral, Florida. In the five years since, Spitzer has revolutionized astronomy and defied expectations at every turn. Hello, I'm Daniel Brennan.

This Spitzer Space Telescope podcast is part of a series highlighting recent discoveries in infrared astronomy. It's produced by NASA's Spitzer Science Center at the California Institute of Technology in Pasadena. The Spitzer mission is managed by NASA's Jet Propulsion Laboratory.

The Spitzer Space Telescope was designed to operate for two and a half years, with a goal of lasting five years. Now entering its sixth year, it continues to operate beyond its design life, and to do things that were thought impossible at the time it launched.

Spitzer's 85-centimeter primary mirror is too small to resolve planets around other stars. And yet, in 2005, Spitzer became the first telescope to directly detect light from an exoplanet. This astounding feat was accomplished simply by taking several observations of the light of a star with a known planet. When the planet is behind the star, the light detected comes only from the star. The rest of the time, the light detected is the light of the star plus the light of the planet. So, by subtracting the light from the star alone from the total, scientists were left with the light of only the planet.

Since that first discovery, scientists have continued to refine the technique, and have subsequently gotten detailed information about the planets themselves. Detailed temperature maps have been drawn up. Some have clear temperature differences between the day and night side, and some have a fairly uniform temperature -- an indication of strong winds circulating heat around the atmosphere. One even has a mysterious hot spot that doesn't point at its parent star. The chemical compositions of their atmospheres are slowly being unraveled.

Spitzer has proven to be a powerhouse in studying extrasolar planets. In 2005, Spitzer showed that planets can form around tiny brown dwarfs. In 2007, a Spitzer study showed planets might be found commonly around binary stars. And in 2006, Spitzer even determined that planets might be forming around a dead star that went supernova 100,000 years ago. Spitzer studies published in 2008 indicate that Earthlike planets may be extremely common in the universe, but a 2007 study indicates that moons like ours are probably relatively rare.

And Spitzer continues to challenge scientific convention. Spitzer has helped to show that water is extremely common in the universe, and has found organic molecules -- the building blocks of life -- throughout our galaxy and even in extremely distant galaxies. And, perhaps most dramatically, a Spitzer study published in 2008 redrew the map of the Milky Way, demoting two spiral arms to gaseous regions rather than true stellar features.

Spitzer is operated as a true astronomical observatory, where scientists from around the world can apply for time to do studies unconceived at the time Spitzer was designed. So perhaps it shouldn't be a surprise that a large part of Spitzer's legacy has come in conjunction with other observatories around the world, and beyond. In 2004 and 2005, Spitzer aided in characterizing the newly discovered plutoids Sedna and Eris. Support of 2005's Deep Impact mission by Spitzer unlocked the composition of comets. In 2007, Spitzer's unique orbit -- orbiting the Sun, trailing behind the Earth -- gave scientists a wide binocular view of the cosmos when combined with observations from Earth, allowing distances of objects very far away to be measured directly.

Other Sptizer surprises have included the 2006 detection the glow from the very first objects to form after the Big Bang -- way out at the edge of the visible Universe -- objects originally thought to be too faint to be detected by Spitzer through all the foreground objects. And in 2007, Spitzer revealed that black holes are very common, but frequently enshrouded in dust and therefore invisible without Spitzer's infrared capabilities.

The Spitzer Space Telescope can continue its primary operational phase until it finally runs out of the liquid helium coolant that keeps its instruments and mirror cold enough to detect the faint glow of infrared light without saturating its detectors with its own heat. Current estimates now indicate this will occur sometime in the spring of 2009. But, don't count this robust little observatory out at that point either -- one of its instruments will continue to function -- and the surprises will just keep coming. For the Spitzer Science Center, I'm Daniel Brennan.

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