TALES OF SPITZER

Earlier this year, Spitzer Space Telescope was officially retired after 16 years in orbit, leaving behind a trove of memories for hundreds of people involved in its trailblazing mission.

In January 2020, NASA's Spitzer Space Telescope mission ended, bringing to a close a pivotal chapter in astronomy. Designed to last up to five years, Spitzer spent more than 16 years probing the cosmos with its infrared vision. The mission's observations led to many discoveries, including soccer-ball-shaped molecules in space called buckyballs; the largest ring around Saturn; and infant galaxies at the dawn of time.

Some of the biggest surprises from Spitzer involved its studies of planets around other stars, or exoplanets. Though not designed to study exoplanets, Spitzer turned out to be a trailblazer in this field. Perhaps its most notable detection was of a family of seven rocky planets around the star system TRAPPIST-1.

The Spitzer mission was led by JPL, and its science operations took place at IPAC. Spitzer data will continue to be archived at IRSA (NASA/IPAC Infrared Science Archive) and studied by astronomers around the world. Here, in excerpts from blogs that can be found on Spitzer's website, various members of its staff recall their favorite memories.

Matthew Ashby is an astrophysicist at the Center for Astrophysics in Cambridge, Massachusetts. Ashby has been a member of Spitzer's Infrared Array Camera instrument team since 1998.

At one point during the troubleshooting, I was invited in to Lockheed's clean room to view the spacecraft up close, partially unwrapped and disassembled to expose the nozzles that needed work. It was about the size of a comfy living room chair.

I had two thoughts. The first was: 'Look at that! We're going to send THIS THING millions of miles out into space!' (Because there was no real doubt the nozzles would get fixed.) The second was: 'Step back, Matt. You could sneeze on, or even worse, bump into that. You'll knock it over and be remembered forever as THAT guy.' …

You can imagine the anxiety we all felt later when it came time to launch Spitzer. Would it reach orbit? Would it work once it got there? (Selfish corollary: Would I have a job next week?) I carried quite a bit of excitement mingled with worry when my family and I went to the jetty on the Banana River across from Cape Canaveral on launch night. From there, we joined many other Spitzer people (outnumbered by the nighttime anglers) to enjoy the clear view of the brightly lit, blue-and-white Delta II heavy rocket sitting on its pad while the launch sequence counted down to zero. →

the size
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If you've never seen a spacecraft launch, well, I recommend it. I'll never forget my panic trying to wake up my 2-year-old son in time to watch Spitzer lift off. But that was unnecessary: it was LOUD! It shook my whole body. And I'll never forget the sight a few moments later when the booster rockets separated downrange over the Atlantic. The moment the boosters spun away and blinked out one by one in the darkness is when I finally let myself start to relax and believe everything was going to work okay.

Mike Werner is project scientist for the Spitzer Space Telescope and chief astronomy and physics scientist at JPL. He is co-author of *More Things in the Heavens: How Infrared Astronomy Is Expanding Our View of the Universe*, a new book about Spitzer's legacy.

the afterglow of a gamma-ray burst

I have a soft spot in my heart for a fairly obscure Spitzer result—our detection of the afterglow of a gamma ray burst. The story begins on the morning of Thursday, March 20, 2008 when Spitzer Science Center Director Tom Soifer (BS '68) and I were having our regular weekly tag-up with program scientist Doug Hudgins at NASA Headquarters. ... On this occasion, he surprised us by asking if we had heard about the naked eye gamma ray burst.

This was too good a chance to pass up, so right after the call I contacted Shri Kulkarni at Caltech, an experienced and enthusiastic observer of transient phenomena. Before the end of the day we had generated a Director's Discretionary proposal asking the Spitzer team to interrupt its already scheduled observing sequence to squeeze in an observation at the position of the gamma-ray burst. The urgency was dictated by the fact that the afterglow of gamma rays bursts was known to decay within a few days, at least at visible wavelengths. After seeking external advice, Soifer approved the request, and Spitzer was pointed at the burst position in less than two days after making the request. … We imaged the field with the thumbnail-sized 15um peakup array of the infrared spectrograph (IRS), readily detecting a source at the position of the afterglow. …

This is where the fun begins. Because we could only be certain of having seen the burst if something varied with time, we had scheduled a second observation eight days after the first. In between the two observations, it was observed that the data coming back from the IRS were badly garbled. … Jeff van Cleve of the IRS team and Jim Ingalls at the SSC somehow figured out that if the corrupted data were shifted by just the right amount the images could be reconstructed. When they reconstructed the second epoch of the burst source in this fashion, the afterglow could no longer be seen. The Spitzer data were thus important in constraining the time history of the afterglow.

So this is one of my favorite Spitzer stories. All of us who worked on the project have a treasure trove of these; they form part of the fabric of our lives.

Whitney Clavin is a senior content strategist in Caltech's Office of Strategic Communications. Clavin worked at JPL for 13 years as a science writer and media specialist, and covered the Spitzer mission.

the rumble of a rocket in my bones

Only a month or so after I started the job, in the summer of 2003, Spitzer launched into space aboard a rocket that blasted off from NASA's Kennedy Space Center. One of my first assignments was to attend the Spitzer launch and help with press. In reality, I'm not sure I was much of a help, being so new to Spitzer and NASA launches. But in that swampy place of alligators and space shuttles, I was bit by the Spitzer bug and was thrilled to learn more.

Another JPL media rep, Gay Hill, was sent out to the launch with me. We were both new to NASA launches and wound up lost a few times on the grounds of Kennedy; at one point, we found ourselves deep into the Cape Canaveral air force station, and security had to escort us out. The trip was probably one of the most memorable of my life, and the launch itself, which took place at night, amounted to the first time I felt the rumble of a rocket in my bones.

Anna Sajina is an associate professor of astronomy and astrophysics at Tufts University. Sajina was part of one of the very first groups of visiting graduate students at the Spitzer Science Center in 2003.

In analyzing the Spitzer mid-IR spectra, some of our key results involved finding dust-obscured, accreting supermassive black holes and finding that this kind of activity is much more common than previously thought. One of my favorite memories is a project I led where we detected the presence of water ice in galaxies nearly 10 billion years in the past. This water is likely part of the icy mantles of interstellar dust grains. Combined with the ubiquity of complex hydrocarbons, again seen in the mid-IR spectra, this finding makes it clear the raw ingredients for the development of life are already commonly found throughout the universe, and only a few billion years after the Big Bang!

Read more Spitzer blog posts at www.spitzer.caltech.edu/explore/blog

Aomawa L. Shields is an assistant professor of physics and astronomy at UC Irvine. Shields is also an actor.

It was the exoplanets that kept stopping my heart

I had almost forgotten that I loved the stars and the universe. I had left an astrophysics PhD program to study acting because I didn't think I belonged, and I loved to tell stories. I ran away from the stars and then tried to become one, getting a master's in fine arts and then working odd jobs to pay the rent. …

Then I looked back up at the sky, and I didn't want to look anywhere else again. I emailed a research adviser from my undergraduate days. She told me jobs were often posted on this website for the Infrared Processing and Analysis Center, or IPAC, at Caltech. So, that day, I went to that website. And there it was: an ad for a helpdesk operator supporting NASA's Spitzer Space Telescope. …

I never mentioned I was an actor in the interview. I didn't want to be labeled as a flake. ... Once my supervisor on the science user support team was confident I was dependable, going to auditions during my lunch break wasn't a big deal. But I ended up wanting to stick around and go to astronomy talks. Since I'd left the field, the discovery of planets orbiting stars other than the sun, called exoplanets, had exploded. Scientists came to IPAC to talk about all sorts of astronomical phenomena, but it was the exoplanets that kept stopping my heart. ...

Later, I got to schedule observations on the spacecraft, which was like fitting jigsaw puzzle pieces together. How efficiently could I schedule my week this time? How little could I make the spacecraft have to slew between targets? ... My supervisor was so patient, so kind, and so meticulous, and I learned how to be that way, too. I tried to bring those qualities with me back to graduate school when I studied astronomy the second time around. The meticulous part was especially useful in research, but the kindness has also never failed me.

I'm a professor of astronomy now. I am also an actor and speaker. It all works together. … I can't help thinking that everything I have, including things I never knew I wanted, I have because I got to work for such a fantastic mission. Thank you. Even as it ends, I won't ever forget.