

was entirely because of his own careful messaging. “Glenn was an astute politician,” she explains on page 139. “He sold US space exploration by downplaying competition with the Soviet Union, and explaining the local relevance of space exploration to the Burmese people.”

Surprisingly, Muir-Harmony’s fine-grained analysis shows that President John F. Kennedy’s focus on the space race was not just about “beating the Soviets,” but also about defining his presidency in opposition to the perceived failures of the Eisenhower administration. He believed that success in the space race would position the Democrats as the party of vision and imagination. Muir-Harmony explains how Kennedy’s masterful commu-

nication skills aided in that effort: Television appearances regarding the space race were tightly scripted, and larger PR events were deftly orchestrated.

My favorite part of the book is the description of journalist Edward R. Murrow’s role in creating the narratives of the space race. For historians of Cold War communication, it comes as no surprise that Kennedy recruited Murrow, a public relations expert, to lead the USIA in 1961. At the time, Murrow was one of the most trusted correspondents in America; his weekly television series *See It Now* was one of the most watched programs in the 1950s.

Kennedy tasked Murrow, as head of the USIA, with developing a global com-

munication strategy to promote the US position in the space race. Murrow was fascinated by science, as I have discussed in my own work, and *See It Now* episodes on topics such as nuclear weapons had boosted his reputation in many scientific circles. Muir-Harmony shows us how he carefully guided the development of press kits, news releases, and films that celebrated the Mercury and Apollo missions. Although other communicators, such as Walter Cronkite, helped guide the public’s image of the Apollo years, Murrow played a pivotal role at its inception. I am delighted that *Operation Moonglow* finally gives Murrow his due credit as a science communicator.

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NASA/JPL-CALTECH/GLIMPSE & MIPS GAL TEAMS

An IR image of the nebula W51, one of the most active star-forming regions in the Milky Way, captured by the *Spitzer Space Telescope*.

## The legacy of a great observatory

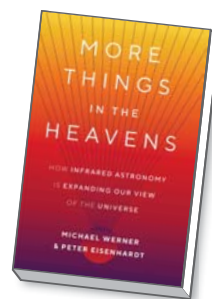
The *Spitzer Space Telescope* is one of four large astronomical observatories launched by NASA in the 1990s and early 2000s; the others are the *Hubble Space Telescope*, the *Chandra X-Ray Observatory*, and the *Compton Gamma Ray Observatory*. An extremely sensitive telescope, *Spitzer* observed the mid- and far-IR bands of the electromagnetic spec-

trum. It was the last of the so-called Great Observatories to be launched, in 2003, and it was decommissioned at the end of January 2020. *More Things in the Heavens: How Infrared Astronomy Is Expanding Our View of the Universe* captures *Spitzer*’s scientific legacy.

The book’s authors, Michael Werner and Peter Eisenhardt, worked on *Spitzer*

**More Things in the Heavens**  
How Infrared Astronomy Is Expanding Our View of the Universe

Michael Werner and Peter Eisenhardt  
Princeton U. Press, 2019.  
\$35.00



for decades (as did this reviewer). Because they wrote *More Things in the Heavens* for a general audience, they did not use equations, but they still lean heavily

on technical figures. Along with quantitative graphs, such as spectral energy distributions and color-color diagrams, the authors include many "indicative color" images of astronomical objects in which the IR wavelengths observed by *Spitzer* are mapped to the red, green, and blue that our eyes can see. Those aspects could make the book difficult for non-technical readers, but most readers of *PHYSICS TODAY* should have no problems understanding the science.

Most of the book is devoted to the major discoveries made by physicists and astronomers who used *Spitzer*. Perhaps the most important are the observations of star and planetary-system formation in the Milky Way and distant galaxies. The ideal targets for *Spitzer* were stars and planetary systems that formed in nebulae where interstellar dust blocks essentially all visible light yet allows IR radiation to escape. The blocked light also heats the dust, which then produces more IR radiation. Astronomers used *Spitzer* to analyze accumulations of circumstellar dust—commonly known as debris disks—that seemingly are left

over after planet formation.

Images from the telescope also yielded star-formation maps of nearby galaxies. Likewise, data gathered by *Spitzer* of IR brightness from distant galaxies were used to derive their total star-formation rates.

Exoplanets were discovered well after *Spitzer* was designed, but the telescope's extremely stable orbit meant that astronomers could use it to precisely study the small dips in stellar brightness that occur when exoplanets transit across stars. Such unexpected applications highlight the value of general-purpose space facilities like *Spitzer*; they can be used to study new phenomena never dreamed of during the mission's planning.

*Spitzer* was also effective at finding accreting supermassive black holes in the centers of galaxies. They power so-called active galactic nuclei, regions at a galaxy's center that have a high luminosity and include the most luminous known quasars. The radiation from those nuclei has nearly power-law spectral energy distributions, which means they emit more in the long-wavelength IR bands observed

by *Spitzer* than stars, whose emission spectra are quasi-blackbody.

*Spitzer* also observed some of the most distant known galaxies. The *Hubble Space Telescope* first found the galaxies, but it could observe them in only a small segment of the near-IR bands. *Spitzer* provided vital confirmation of the galaxies' ages and distances by showing that the ratio of 3.6  $\mu\text{m}$  light to a shorter wavelength captured by *Hubble* was consistent with the stellar radiation from a young galaxy formed early in the history of the universe.

*More Things in the Heavens* is a well-written account of the accomplishments of a great observatory over its more than 16-year lifetime. It shows how much patience is needed when working on a space mission. I first heard about the mission that became *Spitzer* at a meeting in 1974, and I made observations with it throughout its life. Fortunately, *Spitzer's* scientific return was worth the decades of effort by many dedicated scientists and engineers.

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