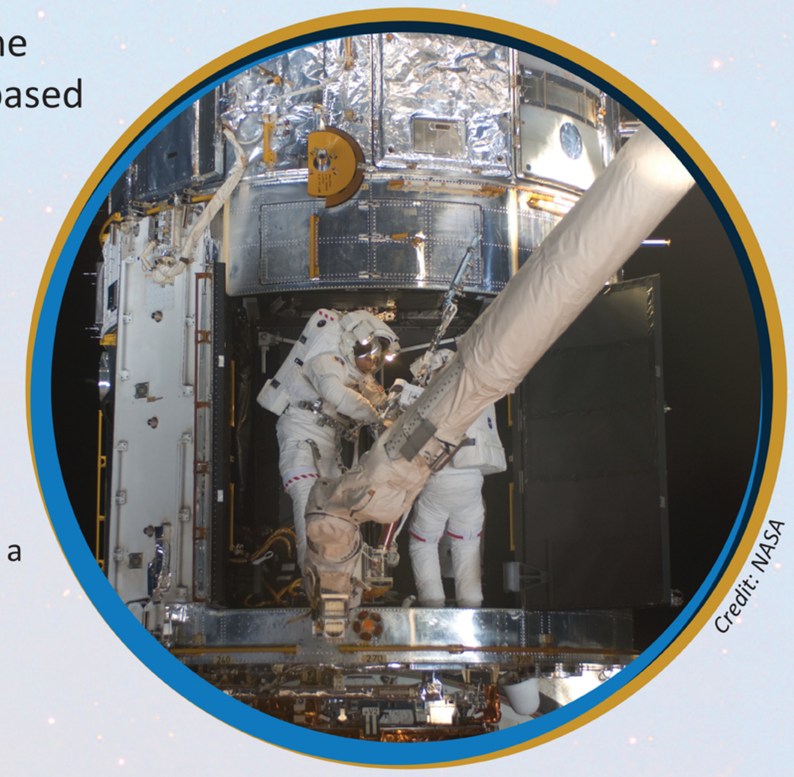
Observing on Earth or in Space?

With the Hubble and other NASA space telescopes pushing the boundaries of scientific knowledge, do we still need ground-based observatories? The answer is a resounding yes!

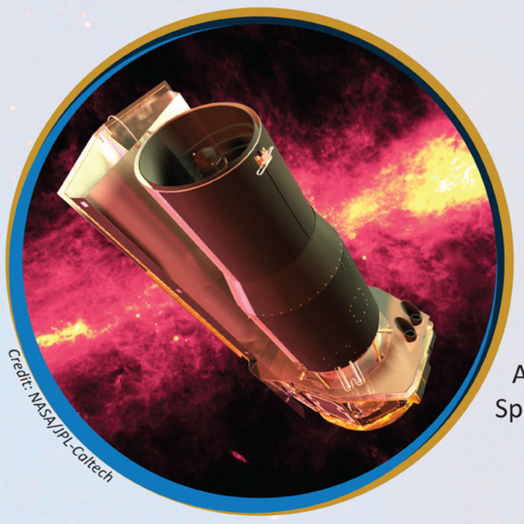
Space Telescopes: Seeing the Unseen

By being above Earth's atmosphere, space-based telescopes like Hubble, Spitzer, and Chandra are able to see farther and give us a clear image especially at wavelengths that our atmosphere blocks such as far infra-red and X-rays. But they are a hassle to operate and are very expensive. For example, it's really hard to get a large mirror into space, and if the mirror has a problem, you need to get someone up there to fix it! No easy task.



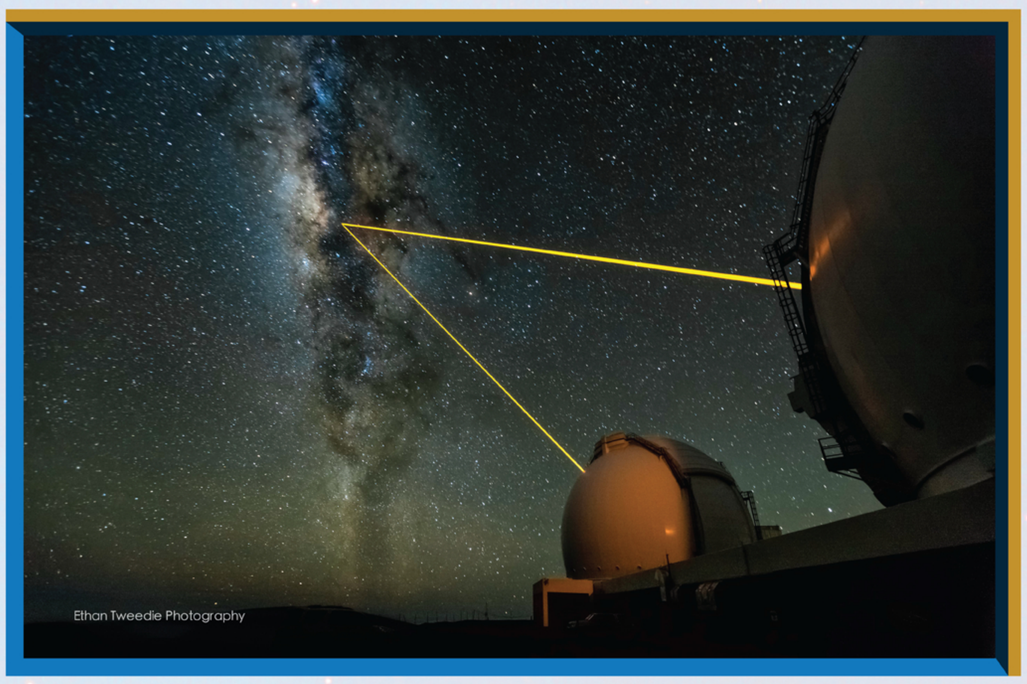
Credit: NASA

Astronauts repairing the Hubble Space Telescope's Imaging Spectrograph.



Credit: NASA/JPL-Caltech

An artist's rendering of the Spitzer Space Telescope: an infrared observatory.

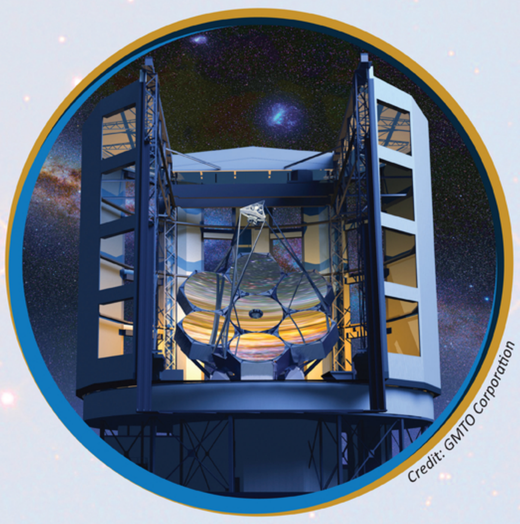


The twin Keck telescopes use both interferometry and laser guide star technologies to increase their seeing power. They can combine the light they gather, making the two 10 meter telescopes into a single giant one.
Credit: Ethan Tweedie

Ground Telescopes: Scouting the Sky

Ground-based telescopes, like those on Mauna Kea in Hawaii, observe at many different wavelengths of light, and are often used as "scouts" for the more powerful space telescopes. Many exoplanets that were confirmed using the Kepler Space Telescope were first spotted at the Keck or Subaru telescopes on Mauna Kea.

Only a small percentage of requests to use Hubble or James Webb get granted. Most astronomers rely on ground-based observatories to conduct their research. They also depend on engineers to keep improving them. Laser guide stars, interferometry, computer actuator controlled mirrors, climate controlled observatories and improvements in mirror coating technologies are all ways engineers are keeping ground-based observatories in the game.



Credit: GMTO Corporation

Artist's concept of the completed Giant Magellan Telescope which will be located in the Atacama Desert, Chile. It will be completed in 2025. The telescope consists of seven 8.4 m (27.6 ft) diameter primary segments, with a resolving power 10 times greater than the Hubble Space Telescope, and will be the largest optical observatory in the world.