Kitt Peak Nightly Observing Program
Splendors of the Universe on YOUR Night!

Many pictures are links to larger versions.
Click here for the "Best images of the OTOP" Gallery and more information.

Clouds

Darn! These pesky intruders have annoyed astronomers for millennia. Kitt Peak usually has clear skies; call us at (520) 318-8726 and join us again some time.

Moon

The same side of the Moon always faces Earth because the lunar periods of rotation and revolution are the same. The surface of the moon is covered with impact craters and lava-filled basins. The Moon is about a fourth of Earth's diameter and is about 30 Earth-diameters away.

2.1 Meter Telescope and Robo-AO

The 2.1 Meter telescope has an 84" primary mirror made of Pyrex, that weighs 3,000 lbs. The telescope became operational in 1964—one of the first operational research telescopes on the mountain. As part of the National Optical Astronomy Observatory (NOAO) for many decades, it is an important part of the history of the mountain, and has made many important contributions to astronomical research. Despite its significant role within the National Observatory, by 2015 the time came to pass the telescope on to new tenants, so NOAO could focus its efforts on its newer, more advanced telescopes. The Robo-AO team stepped in, and installed their state-of-the-art robotic adaptive optics system on the 2.1 Meter. Adaptive optics allows telescopes to nearly eliminate the distorting effects of the atmosphere, greatly increasing the resolution of the telescope. Thanks to its new tenants, suite of instruments, and the dark skies of Kitt Peak, the 2.1-meter continues to make important contributions to astronomical research.
3.5 Meter WIYN Telescope

The WIYN Observatory is owned and operated by the WIYN Consortium, which consists of the University of Wisconsin, Indiana University, National Optical Astronomy Observatory (NOAO), the University of Missouri, and Purdue University. This partnership between public and private universities and NOAO was the first of its kind. The telescope incorporates many technological breakthroughs including active optics hardware on the back of the primary mirror, which shapes the mirror perfectly, ensuring the telescope is focused precisely. The small, lightweight dome is well ventilated to follow nighttime ambient temperature. Instruments attached to the telescope allow WIYN to gather data and capture vivid astronomical images routinely of sub-arc second quality. The total moving weight of the WIYN telescope and its instruments is 35 tons. WIYN has earned a reputation in particular for its excellent image quality that is now available over a wider field than ever before through the addition of the One Degree Imager optical camera.
Arizona Radio Observatory 12 Meter Telescope

Originally, a 36 foot (11 meter) radio telescope resided in this dome. Built in 1967, the 36 Foot Telescope, as it was known, was a part of the National Radio Astronomy Observatory (NRAO). In 1984, it was replaced with a slightly larger dish, and the name was changed to the 12 Meter Telescope.

In 2000, the NRAO passed control of the telescope to the University of Arizona. The University of Arizona had been operating the Submillimeter Telescope (SMT) located on Mount Graham since 1992. When it took over operations of the 12m, it created the Arizona Radio Observatory (ARO) which now runs both telescopes.

In 2013, the telescope was replaced with ESO's ALMA prototype antenna. The new dish is the same size, but has a much better surface accuracy (thereby permitting use at shorter wavelengths), and a more precise mount with better pointing accuracy. The 12m Radio Telescope is used to study molecules in space through the use of molecular spectroscopy at millimeter wavelengths. Many of the molecules that have been discovered in the interstellar medium were discovered by the 12m.

Calypso

Though the Calypso telescope and its 1.2 meter mirror have now been acquired by the Large Synoptic Survey Telescope team, it once occupied the large "garage on stilts" on the west side of the mountain. Edgar O. Smith, a businessman-turned-astrophysicist, designed Kitt Peak’s only privately owned telescope to create the sharpest possible images. The garage-like building rolls away on rails, leaving the telescope very exposed, and able to cool to ambient temperature. Its adaptive optics system can adjust 1,000 times per second to remove atmospheric blurring. Calypso will eventually be moved to Cerro Pachón in the Atacama Desert of Chile. The "garage on stilts" sits empty.
Kitt Peak VLBA Dish

The Very Long Baseline Array (VLBA) is a part of the Long Baseline Observatory (LBO). It consists of a single radio telescope made up of ten 25 meter dishes. The ten dishes are spread across the United States, from Hawaii to the Virgin Islands. One dish is located on Kitt Peak: The LBO Kitt Peak Station. Kitt Peak Station, along with the other dishes, work in unison to point at the same targets at the same time. The data is recorded and later combined. By spreading the dishes out over such a great distance, instead of building them all in the same place, a much higher resolution is gained.

Mayall 4 Meter Telescope

The Mayall 4 Meter Telescope was, at the time it was built, one of the largest telescopes in the world. Today, its mirror—which weighs 15 tons—is relatively small next to the mirrors of the world's largest telescopes. Completed in the mid-'70s, the telescope is housed in an 18-story tall dome, which is designed to withstand hurricane force winds. A blue equatorial horseshoe mount helps the telescope point and track the sky. A new instrument called DESI (Dark Energy Spectroscopic Instrument) will soon be installed on the 4-meter. Once installed, DESI will take spectra of millions of the most distant galaxies and quasars, which astronomers will use to study the effect of dark energy on the expansion of the universe.

The Mayall 4 Meter is named for Nicholas U. Mayall, a former director of Kitt Peak National Observatory who oversaw the building of the telescope.

McMath-Pierce Solar Telescope

The Mc Math Pierce Solar Telescope is actually 3 telescopes-in-one. It was, at the time of its completion in the 1960s, the largest solar telescope in the world. It will remain the largest until the completion of the Daniel K. Inouye Solar Telescope (DKIST) in 2018. The Solar Telescope building looks like a large number 7 rotated onto its side. The vertical tower holds up 3 flat mirrors, which reflect sunlight down the diagonal shaft—a tunnel which extends 200 feet to the ground, and another 300 feet below ground, into the mountain. At the bottom of this tunnel are the three curved primary mirrors, which reflect the light of the Sun back up to about ground level, where the Sun comes into focus in the observing room.
Your Telescope Operator and Guide. Thank you for joining me this evening! See you soon!!

The web page for the program in which you just participated is at Nightly Observing Program. Most of the above images were taken as part of the Overnight Telescope Observing Program. For more information on this unique experience please visit Overnight Telescope Observing Program.

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