

The University of Texas McDonald Observatory at Fort Davis

Understanding the nature of dark energy—a force that is causing the universe to expand faster as it ages—is one of the great challenges in modern science. McDonald Observatory is meeting that challenge with the Hobby-Eberly Telescope Dark Energy Experiment (HETDEX), an innovative experiment that will examine more than one million galaxies that are billions of light-years from Earth. These observations will reveal new details about how the expansion rate has changed over the eons, helping narrow the list of possible explanations for dark energy.

This experiment and many others are adding to McDonald Observatory's legacy of innovation and discovery. Dedicated in 1939 in the Davis Mountains of West Texas, the Observatory is a leader in astronomical research, education, and outreach. It hosts a battery of telescopes, including one of the world's largest. Its astronomers study everything from our own solar system to the most distant galaxies, and they develop new instruments for observing the universe.

McDonald Observatory is extending its reach far beyond Texas as a partner in the Giant Magellan Telescope, a mammoth instrument under construction in Chile. Its primary mirror, which gathers and focuses starlight, will consist of seven segments. Combined, they will cover almost as much area as a basketball court, and will see deeper into space than any telescope yet built. With this telescope, astronomers expect to snap pictures of planets in other star systems and look at the dawn of the universe, allowing them to see the formation of the first galaxies.

McDonald Observatory has been operating some of the world's largest telescopes since its beginning. Its first telescope, with a mirror spanning 82 inches (2.1 meters), was the second-largest in the world. Its second major telescope, completed three decades later, was the world's third-largest at the time. And today, McDonald Observatory hosts the Hobby-Eberly Telescope (HET), with a segmented primary mirror that spans 33 feet (10 meters).

HET has been upgraded to host HETDEX and many other research projects. Engineers have replaced the top half of the telescope, installing new optics that provide a wider view of the sky. And they are finalizing powerful new instruments, including a suite of 156 spectrographs known collectively as VIRUS (Visible Integral-Field Replicable Unit Spectrographs). These instruments allow astronomers to measure an object's temperature, chemical composition, and motion through space. VIRUS will be able to look at as many as 34,000 galaxies or other objects at a time, which is almost like looking at the sky with 34,000 individual telescopes.

In addition to its research role, McDonald Observatory is a busy training ground for astronomy students, both graduate and undergraduate. Students conduct their own observations with some of the telescopes, providing valuable experience for their future careers as scientists and teachers. They also have opportunities to help develop new instruments, which extend the capabilities of the telescopes.

McDonald Observatory is also a leader in astronomy outreach. It produces a daily radio program, StarDate, that airs on more than 250 stations and reaches millions of listeners every week, as well as the bimonthly StarDate magazine.

The Frank N. Bash Visitors Center at the Observatory hosts tens of thousands of visitors every year. It offers interactive exhibits and observatory tours, and conducts star parties every Tuesday, Friday, and Saturday night. The Visitors Center also hosts regular workshops for science teachers and special events for students. These programs have impacted thousands of teachers and hundreds of thousands of students.

For more information about McDonald Observatory outreach, education, and research, visit the [website](#).