Understanding Dark Energy

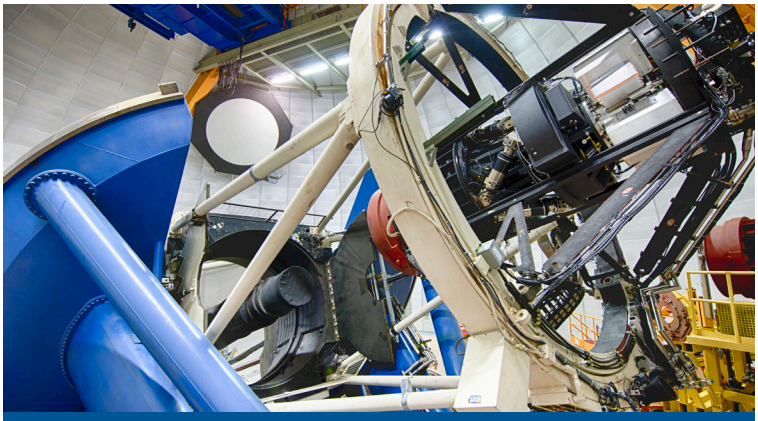
Scientists on the Dark Energy Survey use one of the world's most powerful digital cameras to look for cosmic mysteries billions of light years away.

What is Dark Energy?

Scientists at Fermilab and other institutions have embarked on a five-year mission to map a portion of the southern sky in unprecedented detail. Their goal is to understand the mysterious force known as Dark Energy. Scientists have discovered that the universe is expanding faster and faster, when gravity should cause that expansion to slow. The Dark Energy Survey will help us understand why, and at the same time will capture astonishing crystal-clear images of our cosmos.

Meet the Dark Energy Camera

The primary instrument of the Dark Energy Survey is one of the world's best digital cameras. Built at Fermilab and mounted on a telescope in the Andes Mountains in Chile, the camera can see light from galaxies billions of light years away. Though only about the size of a phone booth, the camera will allow scientists to create the most detailed galaxy maps ever attempted, which will tell us more about the origin of dark energy. The camera has already allowed scientists to discover some of the faintest and smallest galaxies ever seen, objects which could not be spotted with previous instruments.



The Dark Energy Camera mounted on the 4-meter Blanco Telescope at the Cerro Tololo Inter-American Observatory in Chile.

This image taken with the Dark Energy Camera shows a galaxy that is slightly smaller than our own Milky Way, and 65 million light years away.

By the numbers

The Dark Energy Camera's resolution is 570 megapixels (570 million pixels). A high-end cell phone camera has about 16 megapixels.

The camera can see light from up to 8 billion light years away, and captures more than 100,000 galaxies in each digital image.

The survey, over five years, will map one-eighth of the southern sky, recording information on 300 million galaxies, 100,000 galaxy clusters and 4,000 supernovae.

The Dark Energy Survey is a collaborative effort between scientists at 29 institutions in seven countries.

For more information visit www.darkenergysurvey.org. Images taken by the camera are posted on the blog Dark Energy Detectives at www.darkenergydetectives.org. You can explore in detail what the Dark Energy Camera sees with DECam Interactive at www.darkenergysurvey.org/dark-energy-camera-mosaic.

The Cerro Tololo Inter-American Observatory in Chile. The center observatory houses the Dark Energy Camera.