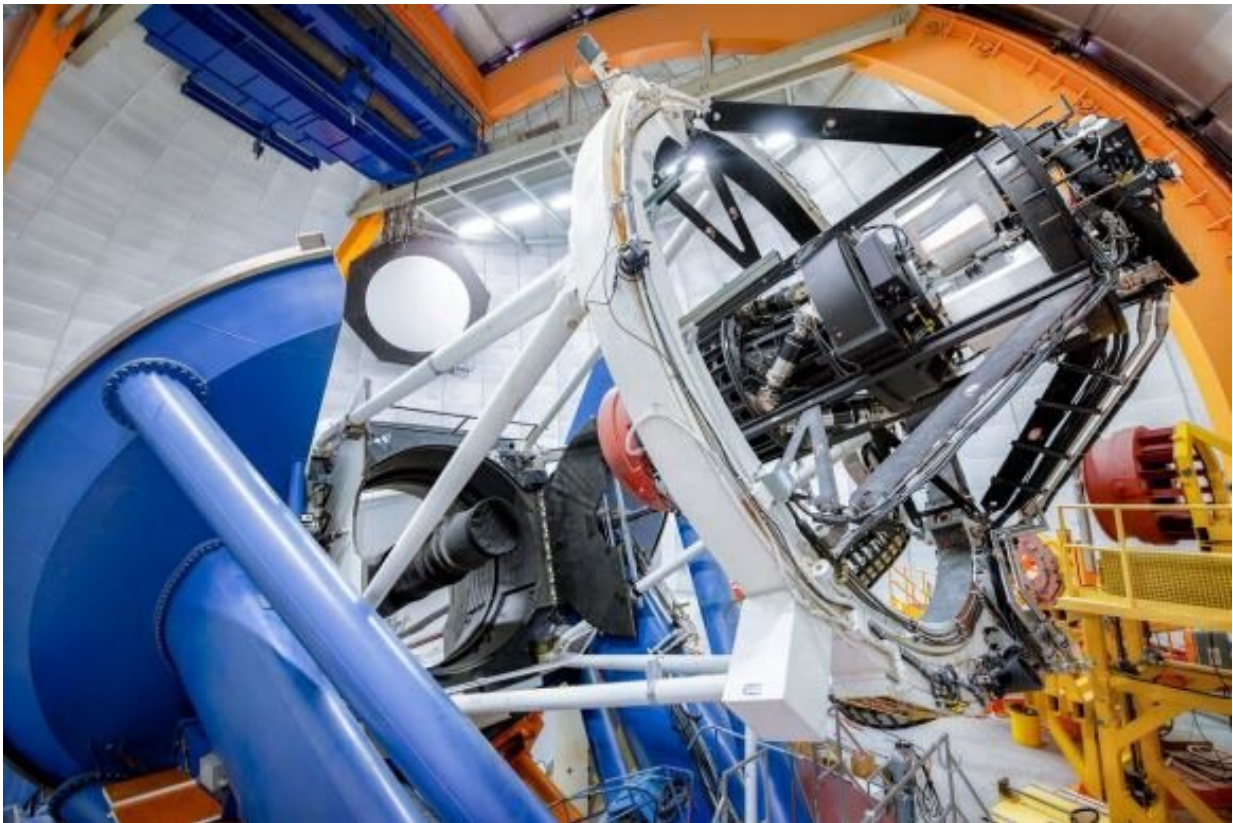# On its hunt for dark energy, a telescope stopped to look at the Lobster Nebula

September 14 2022, by Brian Koberlein



The DECam mounted on the Blanco 4-meter telescope. Credit: DOE/FNAL/DECam/R. Hahn/CTIO/NOIRLab/NSF/AURA

If you thought dark matter was difficult to study, studying dark energy is even more challenging. Dark energy is perhaps the most subtle

phenomenon in the universe. It drives the evolution of the cosmos, but its effects are only seen on intergalactic scales. So to study dark energy in detail, you need a great deal of observations of wide areas of the sky.

This is why ten years ago the Department of Energy worked with astronomers to build the Dark Energy Camera (DECam). It is the highest resolution astronomical camera ever built, with more than 60 imaging CCDs, and captures images at 570 megapixels. It was installed at the Víctor M. Blanco 4-meter Telescope at Cerro Tololo Inter-American Observatory in Chile, where it has a field of view more than 2 degrees wide, which is four times the apparent width of the Moon.

Between 2013 and 2019, DECam captured an average of 400–500 images a night, looking at distant supernovae, measuring the scale at which galaxies cluster together, and studying the weak gravitational lensing of intergalactic dark matter. This data has given us a deeper understanding of dark energy and helped astronomers constrain observations so they can better fit theoretical models to observation.

But as DECam reached its first decade of operation, the team decided to do something a little different. A high-resolution wide-field camera is great for capturing data, but it's also pretty good at capturing some amazing images. So the team pointed it at the nebula NGC 6357, also known as the Lobster Nebula. It's about 8,000 light-years from Earth in the constellation Scorpius and is an intense star-forming region. You can see the results in the image below, which is pretty stunning.
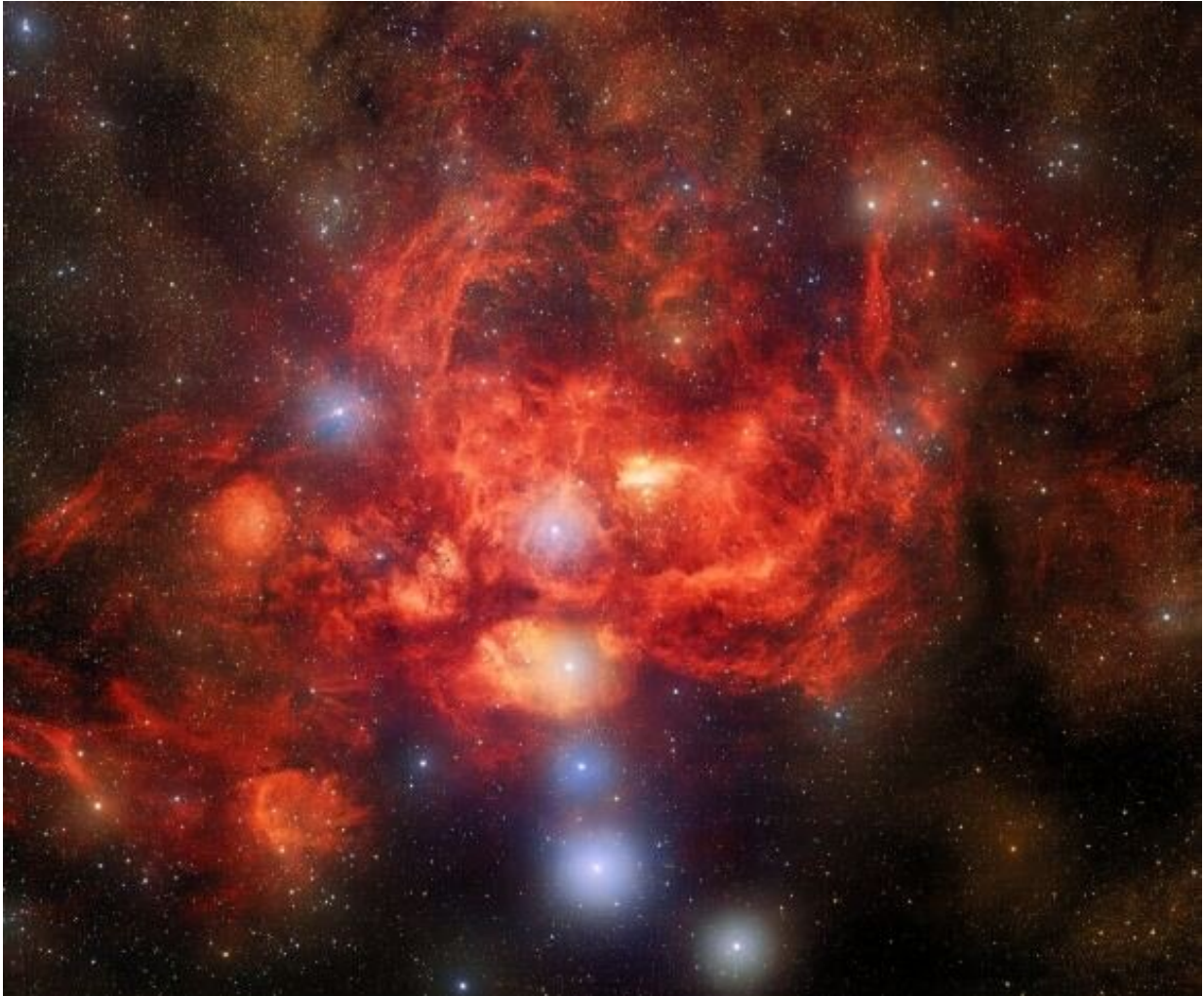
The Lobster Nebula NGC 6357 as seen by the Dark Energy Camera. Credit: CTIO/NOIRLab/DOE/NSF/AURA

The image spans about 400 light-years and shows bright young stars among dense regions of gas. To capture the details of this image, the DECam team used narrow band filters to take images of specific colors within the nebula. Then combined and colorized these images to create the [final image](link). It's an amazing demonstration of what the DECam can do.

Of course, with a decade of work under its belt, the DECam has no intention of stopping any time soon. It has recently captured its one-millionth image, and given time it just might capture a million more.