

The ROOQUE de Los MUCHACHOS

Europe's most crowded piece of astronomical real estate sits 2500 metres up on a small island in the mid-Atlantic. Here astronomers from around the world converge to use some unique and powerful telescopes.

The small island of La Palma is one of the Canary Isles, a Spanish territory some 100–500km off the coast of north west Africa.

At its peak, in the midst of a national park, rises the extinct volcano of the Roque de Los Muchachos, where a combination of dry atmosphere and clear weather ensures some of the best observing conditions in the northern hemisphere.

As a result, it's little wonder that more than a dozen separate instruments cluster around the summit, forming an astronomical centre second only to Mauna Kea in Hawaii.



INSIDE INFO

A TROUBLESOME MOVE

The initial move of the Isaac Newton Telescope from Sussex to La Palma was a difficult one. The INT's mount had to be redesigned to operate at a lower latitude, the mirror was replaced and a new control room was built to operate in the cold conditions at the top of the mountain.

One unexpected problem, however, was caused by local workmen. As is customary, the INT's telescope was designed to sit on a platform that was independent from its observatory dome, so that vibrations from the dome's movements were not transferred to the telescope. When the workmen discovered an "air gap" of several centimetres between this inner platform and the dome's platform, they did not realise its function and "helpfully" filled it in with concrete. This was impossible to remove, but fortunately does not seem to affect the INT's performance too much.

Isaac Newton Group of Telescopes/ Javier Méndez



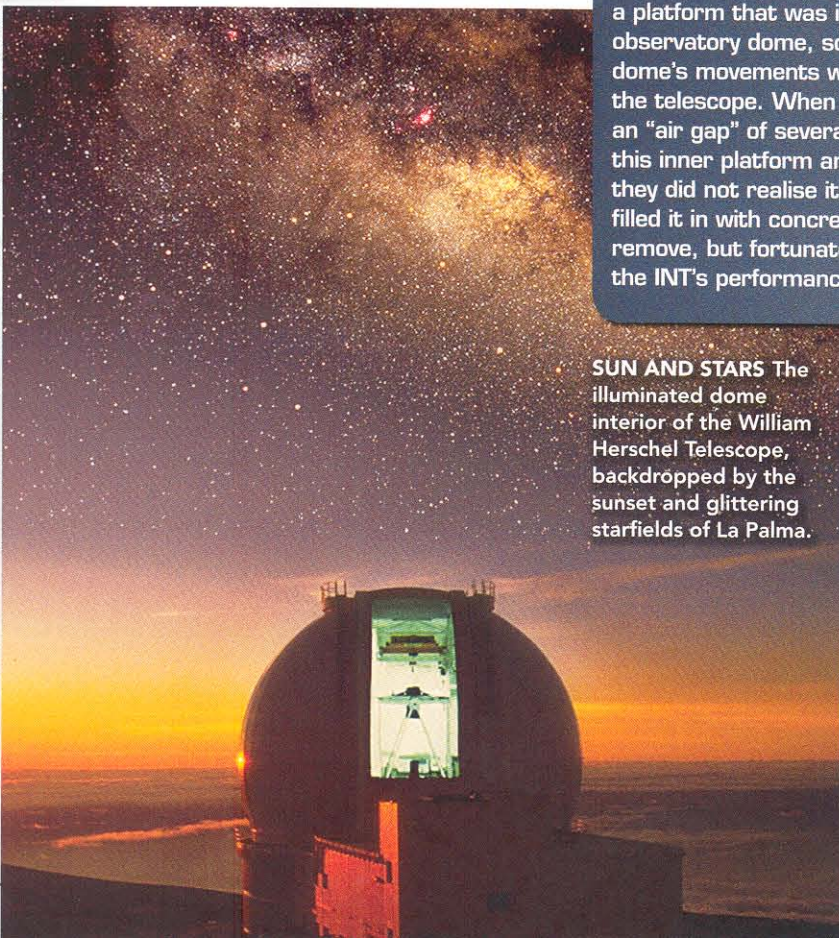
NEW HOME The Isaac Newton Telescope, safely installed in its dome at its new location on Roque de los Muchachos.

SUN AND STARS The illuminated dome interior of the William Herschel Telescope, backdropped by the sunset and glittering starfields of La Palma.

POPULAR ROCK

The observatory began its life in the late 1970s when the Astrophysical Institute of the Canary Isles began to outgrow its old home at La Teide Observatory on the neighbouring island of Tenerife. The Canaries had already become the ideal destination for many universities looking to site their instruments in reliable weather. Also at that time, Britain's Royal Observatory (then based at Herstmonceux Castle in Sussex) was facing up to problems caused by light pollution and poor weather. It was looking to relocate its largest instrument, the 2.5m-diameter Isaac Newton Telescope (INT), and La Palma seemed like the ideal

Isaac Newton Group of Telescopes/Nik Szymanski & Ian King



place. Soon, Spain, Sweden, Denmark and the United Kingdom had all signed a deal to create a new mountain-top observatory.

Moving the INT created a host of problems (see Inside Info), but the viewing conditions on La Palma proved so spectacular that plans were soon afoot to put another major telescope there – the Anglo-Dutch William Herschel Telescope (WHT). Completed in 1987, with a mirror diameter of 4.2m, this was one of the largest telescopes in the world at the time and is still one of the finest instruments in the northern hemisphere.

Meanwhile, astronomers from other nations were also flocking to La Palma. Through the 1980s and 1990s, Italian, Belgian and several Scandinavian telescopes came into operation on the site.

A VARIED OUTLOOK

Telescopes at the Roque de Los Muchachos carry out a wide range of research. The INT and WHT are traditional optical instruments, designed to grab as much light as possible and focus it onto ultra-sensitive detectors. Originally plates of photographic film, these days the detectors are electronic image sensors called CCDs.

The other telescopes operate in different ways. The Swedish Solar Telescope and the Dutch Open Telescope both study the Sun in unprecedented detail. The UK's SuperWASP is an array of eight wide-field cameras that photograph huge areas of sky at regular intervals, searching for the telltale dip in starlight caused by the transit (see Glossary) of extrasolar planets. Perhaps the strangest instrument of all is MAGIC. Although it has the largest mirror in the world (17m in diameter and made from dozens of individual cells), the Major Atmospheric Gamma-ray Imaging Cerenkov Telescope spends most

of its time monitoring Earth's upper atmosphere for flashes of "Cerenkov radiation" (see Glossary) caused by high-energy cosmic ray particles.

Aside from MAGIC, however, all the current telescopes are about to be dwarfed by the 10.4m Gran Telescopio Canarias – a collaboration of Spanish, Mexican and US institutions. Designed to observe the sky in infrared as well as visible light, the telescope was built in mid-2007 and is currently undergoing commissioning tests. When fully operational, it will be the largest single telescope in the world. However, one day it may have a bigger neighbour – the Roque de Los Muchachos is one of the sites under consideration for the truly colossal 42m European Extremely Large Telescope.

GLOSSARY

Transit: An event in which a small object, such as a planet, passes across the face of a larger object, such as a star.

Cerenkov radiation: A flash of radiation produced when a particle travels through Earth's atmosphere faster than the speed of light in the air.

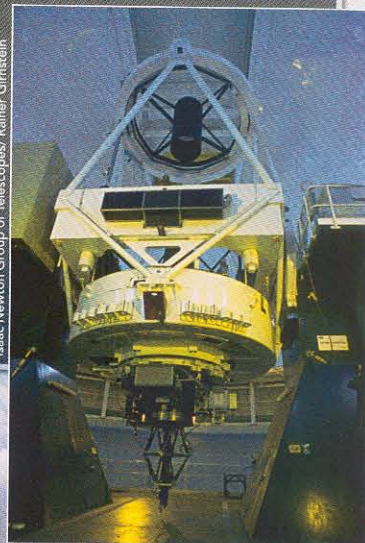


BREAKTHROUGHS

TRACKING AN IMPACT

In October 2008, UK astronomers using the William Herschel Telescope achieved a notable first when they tracked a small asteroid that was about to enter Earth's atmosphere and explode. Named 2008 TC3, it was a 4m-wide lump of rock with a mass of about 80 tonnes. It was discovered on 6 October by US astronomer Richard Kowalski of the Catalina Sky Survey, a project designed to look for potentially threatening asteroids. When it became clear that the asteroid was heading straight for Earth, reports flew around the world that allowed astronomers to make a huge range of measurements before it entered the atmosphere. La Palma was the last major observatory to have sight of the asteroid and astronomers were even able to detect its chemical composition shortly before it broke up 37km above Sudan's Nubian Desert.

ASTEROID TRACKER A view of the William Herschel Telescope, looking up to the closed hatch of the dome above.



Isaac Newton Group of Telescopes/ Rainer Grunstein

ON THE EDGE Lined up along the rim of the volcano, from far left: the William Herschel Telescope, the Dutch Open Telescope, the Swedish Solar Telescope, the Isaac Newton Telescope and the Jacobus Kapteyn Telescope.

Isaac Newton Group of Telescopes/Nik Szymanek

