The Black Hole in the Milky Way

What lies at the centre of the Milky Way? For a long time, astronomers have suspected that a black hole lurks at the heart of our galaxy, but could not be sure. Black holes are celestial objects with such an immense gravitational grip that not even light can escape. Studying the black hole at the heart of the Milky Way allows astronomers not only to gain a better understanding of our own home galaxy, but also of the role of black holes in the formation and evolution of other galaxies.

Thanks to an extended campaign of Galactic Centre observations, which began in 1992, scientists have used ESO telescopes, first at La Silla and later at Paranal, **to finally obtain conclusive evidence of the existence of this black hole.** Stars at the centre of the Milky Way are so densely packed that special imaging techniques such as adaptive optics, which compensates for the Earth's atmosphere to create much sharper images, were used with the Very Large Telescope (VLT) to track the stars.

Astronomers were able to watch individual stars with unprecedented accuracy as they moved around the Galactic Centre. The paths taken by the stars showed conclusively that they must be orbiting in the gravitational pull of a supermassive black hole, about four million times more massive than the Sun. Astronomers also use the VLT to peer into the centres of galaxies beyond our own, where they again find clear signs of supermassive black holes.

The central parts of our galaxy, the Milky Way, as observed in the near-infrared with the NACO instrument on ESO's Very Large Telescope. Credit: ESO/S. Gillessen et al.

The night sky above Paranal. The VLT is observing the centre of the Milky Way. The laser beam produces an artificial guide star for the VLT's adaptive optics system. Credit: ESO/Y. Beletsky