The galaxy is sandwiched between a pair of giant radio-emitting lobes and its enormous energy output is caused by material falling towards the black hole while, at the same time, some of this material is ejected at almost light speed.

The elliptical galaxy NGC 5128, host of the Centaurus A radio source, as it appears in visible light. The galaxy is about 12 million light years away and is one of the closest that has an active super-massive black hole.

Fantastic sights come into focus

Astronomers use radio telescopes to explore the universe by detecting electromagnetic radiation emitted by objects in space.

Radio telescopes detect radio waves and optical telescopes detect light waves. Radio telescopes provide complementary views of the universe compared with those seen with an optical telescope and can reveal areas of space that may be obscured by cosmic dust.

Most of space is empty and a particle of light can expect to travel at least 10 billion kilometres. This means radio telescopes have a good chance of intercepting light from very far away.

Problems for the operation of radio telescopes include noise generated by people, light from cities, burning oil wells, radio energy leaking from microwave ovens, car ignitions, and mobile phones. This makes remote locations in countries such as Australia preferable.

Ultimately, however, man-made problems could drive astronomy outside the Earth and onto satellites. In a perhaps unconscious tribute to the album by acid rock band Pink Floyd, Dr Roopesh Olja says the “dark side of the moon” is a “fantastic sight.”

The all-sky radio survey known as the Molonglo survey, which is funded by the Australian Research Council, has led to the discovery of radio sources in the Centaurus A region. These sources are associated with the giant radio lobes that extend from the center of the galaxy. The lobes are powered by a supermassive black hole located at the center of the galaxy. The lobes are also responsible for the large amount of energy output from the galaxy, which is thought to be important in the evolution of the universe. The galaxy is located about 12 million light years away and is one of the closest that has an active super-massive black hole. The elliptical galaxy NGC 5128, host of the Centaurus A radio source, is visible in this image.
A whole new space odyssey

An Australian-led team of astronomers is unlocking extraordinary secrets of the universe.

Andrew Clark

Galileo, father of modern science, believed all truths "are easy to understand once they are discovered.'

Australian astronomer Rupesh Ojha has advanced the cause of truth about the universe by successfully organising a global effort to unlock the mystery of the "black hole".

Employing recently-developed technology, Ojha also used his native north India charm and enthusiasm to marshal a motley multinational crew of astronomers over the past two years to assemble the most effective telescope system to examine parts of the universe featuring in the southern sky and unlock the secrets of the black hole of a galaxy known as Centaurus A.

Of the nine radio telescopes assembled, six were in Australia (see map). According to Phil Edwards from the CSIRO, who coordinated the crucial Australian involvement in the project, three of the Australian telescopes were run by the CSIRO, two by the University of Tasmania, and one was a joint NASA-CSIRO facility.

Spanning four continents, the nine formed the equivalent of one telescope, with a virtual width of 10,000 kilometres, or 80 per cent of the Earth's diameter.

This synergy is achieved through a technique known as interferometry, which dates back to World War II. But the real breakthroughs occurred in the late 1960s and early '70s and were pioneered by, among others, the Australian astronomer Dave Jauncey. Under the system, radio telescopes are linked to create a larger virtual telescope known as an interferometer.

Advanced computer techniques allow astronomers to combine data from individual telescopes to yield images with the sharpness of a single giant telescope.

"Interferometry has changed everything," Ojha says. The result of this most recent application "is the highest resolution image ever made of an active galaxy". Australian telescopes used in this recent project have previously observed the Centaurus A galaxy. It was discovered in 1826 by James Dunlap at the Paramatta Observatory and reported in the Philosophical Transactions of the Royal Society, in an article titled A Catalogue of Nebulae and Clusters of Stars in the Southern Hemisphere, observed in New South Wales.

Similar to a vacuum cleaner, black holes in space clean up debris left behind.

Ojha says what his recent project did that was "different" is what generated "this highest-ever resolution image". He also used German-owned telescopes in Chile and Antarctica.

As Conrad Hilton once said about hotels, Ojha now says about telescopes: what is important is "location, location, location". This means "the larger the distance between your two furthest telescopes, the better your [image] resolution".

Most telescopes are in the northern hemisphere. However, telescopes in Australia, South Africa, Chile and Antarctica are the only ones that are well located to view a southern object like Centaurus A. The images are not coming from the stars but from the area of a "super-massive black hole". The clarity and precision of these images are due to the fact that they are the visual progeny of Ojha's Tanami project.

This is named after the remote, forbidding desert in central Australia but is also an acronym, standing for - wait for it - Tracking Active Galactic Nuclei with Austral Millimetre Second Interferometer.

So there.

By combining data from the individual telescopes the 35 astronomers, including six from Australia, developed these beautiful, sharp images.

"One can see far more detail than is usual in the study of such galaxies," Ojha tells the Weekend Financial Review from his home close to the NASA Goddard Space Flight Centre in Maryland, near Washington, where he works as an astronomer. "This means almost every question about these objects can and will be revisited."

The significance of this and other breakthroughs, using the interferometry technique, is amplified by a brief after-the-fact journey. Just as F Scott Fitzgerald once observed "the rich are different to us", astronomy is different to any other science as terms like size, weight and distance have a whole new meaning.

For example, the black hole from the Centaurus A galaxy is estimated to be 55 million times heavier than the sun.

At first blush it may seem the...