Upgraded telescope opens window to universe

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An international team of astrophysicists including University of Adelaide researchers have announced the successful detection of pulsed gamma rays from the neutron star, the Vela pulsar, using their newly upgraded telescope system located in Namibia.

This result is the first ground-based detection of pulsed gamma rays from the southern sky. These gamma rays have energies of over ten thousand million times the energy of visible light.

A huge 28-metre diameter telescope was added to the existing four 12-metre telescopes of the High Energy Spectroscopic System (HESS) in Namibia last year.

"This is the culmination of intensive efforts over the past five or so years to construct and commission the world's largest gamma-ray telescope, aiming to push the threshold for reading gamma-ray signals into as low energy range as possible," says Dr Gavin Rowell, from the University of Adelaide's School of Chemistry and Physics, and the only Australian representative of the HESS Collaboration. He will present the results to next week's Annual Scientific Meeting of the Astronomical Society of Australia (21-25 July).

"This is no mean feat since the telescope comprises 500 tons of solid steel and glass, and must be able to re-point to any position in the sky within 30 seconds in response to transient events. The pulsed gamma-rays from Vela also had to be teased out of the much stronger gamma-ray emission coming from other sources."

The Vela pulsar is an ultra-dense, compact spinning object left behind after a supernova explosion. It is no more than about 20 km across and is about 1000 light years away from Earth. The pulsed gamma rays are emitted by the pulsar like a lighthouse beam as it rotates, taking just 89 milliseconds to complete one revolution.

One of the main goals of the new HESS telescope had been to perform at energies low enough to detect pulsar emissions.

"This result now opens the way for HESS to explore the gamma-rays in the sky in a way that allows a much more detailed study of their origin," says Dr Rowell.

"The energy range HESS is now operating in is crucial to our understanding of how pulsars accelerate particles and produce gamma-ray emission. The gamma-rays at these energies are extremely sensitive to the location at which they were formed around the pulsar, so measuring them will help us determine how and where they were formed.

"By understanding these processes we can start to answer some of the bigger questions about the evolution of our universe."

Provided by University of Adelaide

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