

High Energy Mystery lurks at the Galactic Centre

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A mystery lurking at the centre of our own [Milky Way](#) galaxy - an object radiating high-energy gamma rays - has been detected by an international team of [astronomers](#). Their research, published today (September 22nd) in the Journal Astronomy and Astrophysics, was carried out using the High Energy Stereoscopic System (H.E.S.S.), an array of four telescopes, in Namibia, South-West Africa.

The Galactic Centre harbours a number of potential gamma-ray sources, including a supermassive black hole, remnants of supernova explosions and possibly an accumulation of exotic 'dark matter' particles, each of which should emit the radiation slightly differently. The radiation observed by the H.E.S.S. team comes from a region very near Sagittarius A*, the black hole at the centre of the galaxy. According to most theories of dark matter, it is too energetic to have been created by the annihilation of dark matter particles. The observed energy spectrum best fits theories of the source being a giant supernova explosion, which should produce a constant stream of radiation.

Dr. Paula Chadwick of the University of Durham, UK said, "We know that a giant supernova exploded in this region 10,000 years ago. Such an explosion could accelerate cosmic gamma rays to the high energies we have seen - a billion times more energy than the radiation used for X-rays in hospitals. But further observations will be needed to determine the exact source."

Professor Ian Halliday, Chief Executive of the Particle Physics and Astronomy Research Council (PPARC) which funds UK involvement in H.E.S.S. said; "Science continues to throw out the unexpected as we push back the frontiers of knowledge." Halliday added "The centre of our Galaxy is a mysterious place, home to exotic phenomena such as a black hole and dark matter. Finding out which of these sources produced the

gamma-rays will tell us a lot about the processes taking place in the very heart of the Milky Way."

However, the team's theory doesn't fit with earlier results obtained by the Japanese /Australian CANGAROO instrument or the US Whipple instrument. Both of these have detected high-energy gamma rays from the Galactic Centre in the past (observations from 1995-2002), though not with the same precision as H.E.S.S, and they were unable to pinpoint the exact location as H.E.S.S. has now done, making it harder to deduce the source. These previous results have different characteristics to the H.E.S.S. observations. It is possible that the gamma-ray source at the Galactic Centre varies over the timescale of a year, suggesting that the source is in fact a variable object, such as the central black hole.

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