

A stellar black hole capable of expelling powerful jets of particles

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Two French astronomers, working in collaboration with a London-based researcher, have discovered a stellar black hole emitting powerful jets of particles of a total length of 1,000 light years.

Normally, the energy produced by matter falling into a black hole of this type is mainly transformed into X-rays, not into jets. This exceptional black hole is a miniature version of certain supermassive [black holes](#) present in the active nuclei of [galaxies](#). Its discovery, which should improve our understanding of the phenomena involved, is reported in the journal *Nature* of 8 July 2010.

The two CNRS astronomers, based at the Observatoire Astronomique de Strasbourg (CNRS/Université de Strasbourg) and their colleague, based at University College London, used the Very Large Telescope (ESO, Mount Paranal, Chile) and the Chandra X-ray telescope (NASA) in orbit around the Earth. The black hole on which they worked is located at the edge of galaxy NGC 7793, twelve million [light years](#) from Earth.

The two jets of matter that they observed are the most powerful ever discovered for this type of black hole, resulting from the collapse of a star. The jets push back the interstellar medium, hollowing out a large bubble of relativistic [particles](#) and very hot gases around the black hole. This bubble radiates in the optical, X-ray and radio wavelengths: it has been expanding for 200,000 years and now measures 1,000 light years in diameter. It is inflating at a speed close to one million kilometers per hour.

Until now, it was thought that the energy produced by a black hole swallowing matter was mainly emitted in the form of radiation, particularly X-rays. This discovery is all the more surprising as it shows that certain black holes can emit much more energy in the form of jets of particles. These jets, when they come into contact with interstellar gas, trigger a shockwave that causes heating and accelerates the expansion of the bubble.

In the case of the active nuclei of galaxies, which contain supermassive black holes, jets of particles are also observed streaming in the intergalactic medium. This discovery should therefore elucidate the mechanisms by which these jets are produced and their impact on the near and distant environment of the black hole.

More information: A 300 parsec long jet-inflated bubble around a powerful microquasar in the galaxy NGC 7793, Nature, 8 July 2010, M. W. Pakull, R. Soria and C. Motch

Provided by CNRS

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