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## RESEARCH GRAVITATIONAL WAVES: A PROBABLE NEUTRON STAR COLLISION FROM LIGO-VIRGO

A gravitational wave signal coming from a point situated at a distance of 500 million light years from Earth has been observed by the LIGO

and Virgo scientific collaborations. It was presented to the scientific community yesterday evening, which met at the Meeting of the American Astronomical Society underway in Hawaii. The signal, labelled GW190425, was observed at 8:18 a.m. (UTC) on 25 April 2019 and it is the first event captured and published during the third observing run that began last 1 April. The signal is compatible with the fusion of two neutron stars and is similar, therefore, to the event that was announced in October 2017, which led to the birth of multi-messenger astronomy. However, it exhibits some important peculiarities.

The total mass, around 3.4 times the mass of the Sun, is larger than that of any binary neutron star system known in our galaxy, and this has interesting astrophysical implications for the formation of these systems. In addition, no electromagnetic counterpart was observed by the telescopes that gathered the alert sent by the LIGO-Virgo collaboration, unlike what happened in 2017 (GW170817). The data have been analysed with precise analytic models that describe the gravitational wave signal emitted by two neutron stars according to Einstein's general theory of relativity, leading to a reasonable understanding of the event. Although the fusion of the two bodies was not observed, numerical simulations have confirmed that – assuming that the two objects were neutron stars – the probability that the object produced, in the end, was a black hole is equal to 96%.

In any case, the interpretation of the GW190425 signal is ambiguous precisely because of its weakness, and the possibility that one (or even both) of the objects were black holes cannot be entirely excluded.