News story: UK scientists part of astronomical landmark result

Scientists from the University of Leicester and the Mullard Space Science Laboratory at University College London, have been working on the research, thanks to funding from the UK Space Agency.

The outburst took place in a nearby galaxy called NGC 4993, located about 130 million light-years away in the direction of constellation Hydra.

Today, dozens of UK scientists and their international collaborators representing 70 observatories worldwide announced the detection of this event and the significant “scientific firsts” it has revealed about our Universe.

The ripples in space finally reached Earth at 1.41pm UK time, on Thursday 17 August 2017, and were recorded by the twin detectors of the US-based Laser Interferometer Gravitational-wave Observatory (LIGO) and its European counterpart Virgo.

Just 1.7 seconds after the gravitational waves rushed past Earth, NASA’s Fermi Gamma-ray Space Telescope caught high-energy light from an explosion associated with the event. Swift, Hubble and Chandra missions, along with ground-based observatories including the Blanco telescope in Chile used by DES, later captured the fading glow of the blast’s expanding debris.

Once pin-pointed, the Swift satellite quickly maneuvered to look at the object with its X-ray and Ultraviolet and Optical telescopes. Swift is a NASA/UK/Italian mission launched in 2004 to study gamma-ray bursts (GRB). The UK involvement in the mission is as Co-Investigators for the X-ray Telescope through the University of Leicester and the Ultraviolet and Optical Telescope through MSSL.

Prof Julian Osborne said:

> The discovery of early blue emission by Swift from this neutron star collision discovered by its gravitational radiation is a landmark result, a first scientific result from the widely anticipated joint signal conveyed by both light and by gravitational waves.

> The results combine to tell us about the neutron stars, their destruction and its aftermath in which some of the heaviest elements (like gold and platinum) are created. This work was made possible by the UK contributions to the NASA Swift satellite project, including the building its X-ray camera and its ultra-violet/optical telescope, as well as the development of new observing strategies to enable the rapid search of the large sky

> regions to which the gravitational wave signal has been constrained.

Dr Paul Kuin, from UCL Mullard Space Science Laboratory, who works on Swift, said:

> As the collision occurred relatively close to Earth, scientists were able to point telescopes in the direction of the event and get a clear picture of the light. We successfully tracked the UV light using the Ultraviolet and Optical Telescope on-board NASA's Swift satellite which is a UCL built, operated and maintained instrument that has been active since its launch in 2004.

Neutron stars are the dead remnants of massive stars, they contain the mass of our Sun in an object the size of a city. When they collide, some of the neutrons are ripped off and start to interact with each other, forming some of the heaviest elements in the universe. Radioactive decay of these elements then produces light in what is often called a 'kilonova'.

The Swift data gave unprecedented insight into how new elements are formed after a neutron star merger.