



THE UNIVERSITY *of* EDINBURGH

## ***News Release***

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### **Dark matter detector upgraded to aid search for elusive particles**

One of the world's most sensitive scientific instruments has been upgraded to help researchers gain new insights into the make-up of the universe, a study shows.

The detector is searching for tiny particles that would improve researchers' understanding of dark matter – the mysterious material thought to make up about 95 per cent of the universe.

The instrument – known as the Large Underground Xenon, or LUX, detector – is located a mile underground in a former mine in South Dakota, US.

The upgrade increases the chances of the detector identifying sub-atomic particles called WIMPs – weakly interacting massive particles – which scientists believe are the main component of dark matter.

Dark matter – which is invisible – has yet to be detected directly by scientists. It has so far been observed only by its effects on gravity, which can be seen in the rotation of galaxies and the way light bends as it travels through space.

A team of physicists, including scientists at the University of Edinburgh, have made LUX's ability to identify the lightest form of WIMPs about 20 times more sensitive. This has allowed them to study data collected during LUX's initial run in 2013 which previously had to be ignored.

WIMPs are difficult to spot because they collide with normal matter only rarely, and their faint signals are drowned out by cosmic radiation from space.

Housed deep underground where few cosmic rays can penetrate, LUX consists of a tank of liquid xenon surrounded by sensitive light detectors. It is designed to spot collisions between WIMPs and xenon atoms inside the detector. Following a collision, the xenon atom emits a tiny flash of light, which is spotted by LUX's light sensors.

The study, published in the journal *Physical Review Letters*, was supported by the US Department for Energy and the National Science Foundation. The LUX scientific collaborative involves 19 institutions in Europe and the US.

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Professor Alex Murphy, of the University of Edinburgh's School of Physics and Astronomy, who was involved in the study, said: "Since LUX's first run, we have developed several new calibration techniques and methods of analysis. We are now able to look for tell-tale signs of WIMPs in data we previously had to ignore, increasing our chances of detecting dark matter."

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