The Universe broke its rising 'fever' about 11 billion years ago (w/ Video)

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(Phys.org) —An international team, led by researchers from Swinburne University of Technology, has found evidence that the Universe broke its rising 'fever' about 11 billion years ago.

They measured the temperature of the Universe when it was 3 to 4 billion years old by studying the gas in between galaxies – the intergalactic medium. During these early years of the Universe's development, many extremely active galaxies were 'switching on' for the

first time and heating their surroundings.

"However, 11 billion years ago, this fever seems to have broken and the Universe began cooling down again," lead researcher Elisa Boera, a PhD student from Swinburne's Centre for Astrophysics and Supercomputing, said.

"The intergalactic medium is an excellent recorder of the Universe's history. It retains memory of the big events that affected its properties, such as temperature and composition, during its different phases of evolution."

An earlier study found that the Universe caught this fever early in its history. Its authors used a new 'thermometer' – the imprint left on the light by the intergalactic medium as it travelled to Earth from distant, extremely bright objects called quasars.

In the new study, Ms Boera collected the bluest light that Earth's atmosphere transmits – harsh ultraviolet (UV) light from 60 quasars – and used the same method as the earlier study. This UV light comes from slightly later in the Universe's development, allowing the new temperature measurement.

"The quasar light suggests that the Universe had cooled by about 1000 degrees C within 1 billion years after reaching its maximum of 13,000 degrees," Ms Boera said.

"This cooling trend has probably continued to the present day."

Why did the Universe's fever break?

"We think the answer is helium," co-author of the new study Swinburne Associate Professor Michael Murphy said.

"Fourteen per cent of the intergalactic gas is helium and, 12 billion years ago, it was absorbing the intense radiation from active galaxies, losing electrons in the process.

"The electrons whizz around, heating up the gas. It's similar to the greenhouse effect on Earth: Carbon dioxide gas absorbs infrared radiation and heats our atmosphere.

"Once all the helium was ionized, the radiation would simply pass through the gas without heating it.

"Then, as the Universe expands the gas cools down, just like the cold gas sprayed from an aerosol can – it quickly cools as it expands out of the can."

The study has been published in the *Monthly Notices of the Royal Astronomical Society*.

Provided by Swinburne University of Technology

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