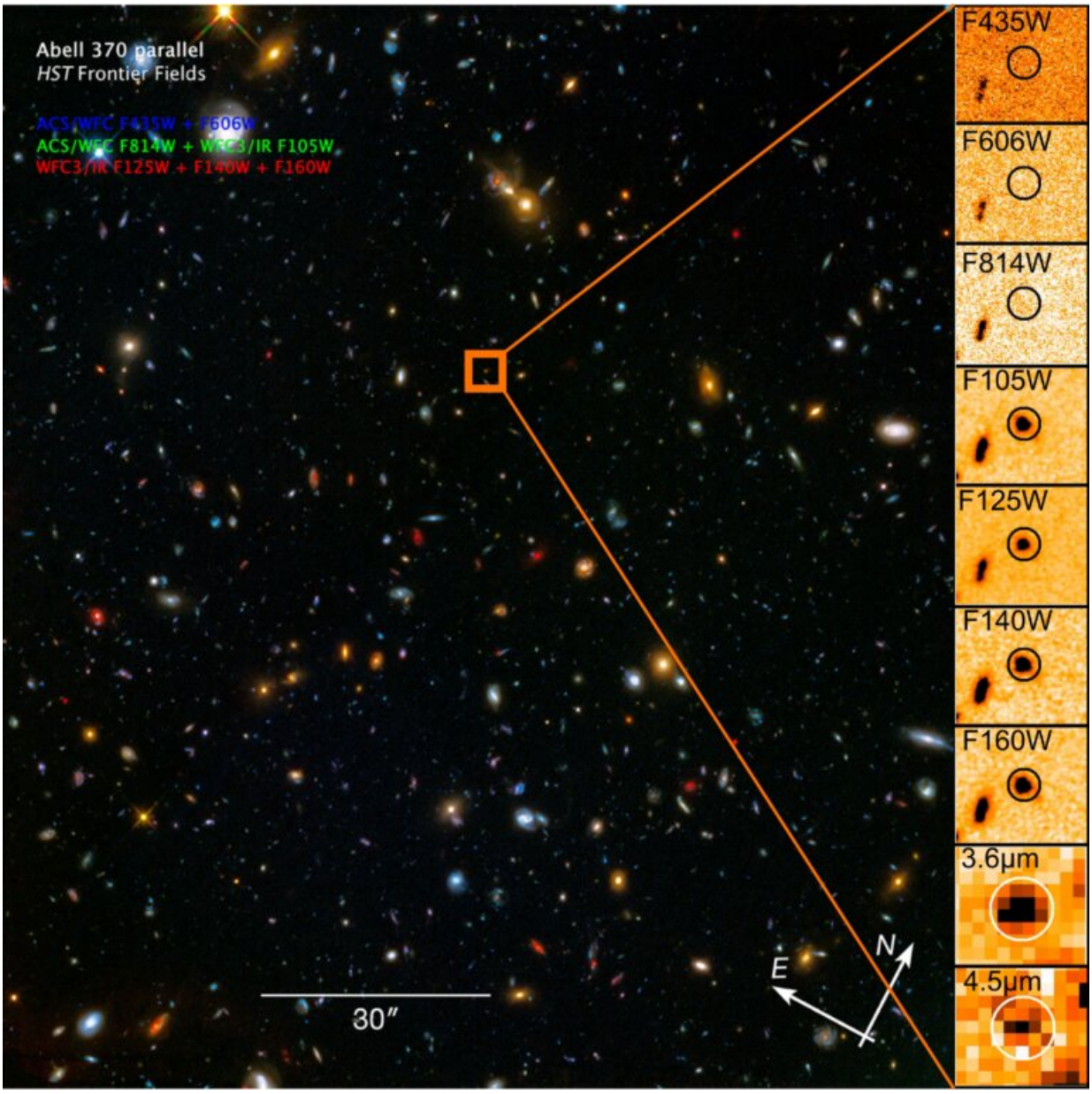
Discovery of a luminous galaxy reionizing the local intergalactic medium 13 billion years ago

July 2 2020



The galaxy A370p_z1 in the Hubble imaging and a zoom-in in each filter. The non-detection in the first three filers, followed by detections in all the redder filter is a typical signature of distant galaxies. Credit: NASA, ESA, Z. Levay (STSci)

Astronomers have discovered a luminous galaxy caught in the act of reionizing its surrounding gas only 800 million years after the Big Bang. The research, led by Romain Meyer, Ph.D. student at UCL in London, UK, has been presented today at the virtual annual meeting of the European Astronomical Society (EAS).

Studying the first galaxies that formed 13 billion years ago is essential to understanding our cosmic origins. One of the current hot topics in extragalactic astronomy is 'cosmic reionization', the process in which the intergalactic gas was ionized (atoms stripped of their electrons). Cosmic reionization is similar to an unsolved murder: we have clear evidence for it, but who did it, how and when? We now have strong evidence that hydrogen reionization was completed about 13 billion years ago, in the first billion years of the Universe, with bubbles of ionized gas slowly growing and overlapping. The objects capable of creating such ionized hydrogen bubbles have however remained mysterious until now: the discovery of a luminous galaxy in which 60-100% of ionizing photons escape, is likely responsible for ionizing its local bubble. This suggests the case is closer to being solved.

The two main suspects for cosmic reionization are usually 1) a population of numerous faint galaxies leaking ~10% of their energetic photons, and 2) an 'oligarchy' of luminous galaxies with a much larger percentage (>50%) of photons escaping each galaxy. In either case, these

first galaxies were very different from those today: galaxies in the local Universe are very inefficient leakers, with only