

"Long before it's in the papers"

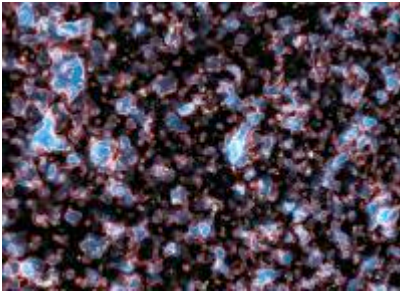
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Astronomers peer into primordial “fog”

Oct. 21, 2010

Courtesy of the European Southern Observatory
and World Science staff

Astronomers say they have confirmed the discovery of the furthest galaxy known, an object so remote that it comes from a time when fog shrouded the universe.



An image from a scientific simulation of the "era of reionization," a period during which early galaxies are believed to have blasted away a fog left over from the birth of the universe. (Courtesy M. Alvarez, R. Kaehler, and T. Abel)

“This is the first time we know for sure that we are looking at one of the galaxies that cleared out the fog which had filled the very early Universe,” said Nicole Nesvadba of the Institute of Space Astrophysics in Paris. She is a co-author of a paper on the findings published in the Oct. 21 issue of the research journal *Nature*.

Because light takes time to reach us, extremely distant objects are seen as they were long ago, when their light left them.

The galaxy is thought to come from a time relatively soon after the “Big Bang” event that gave birth to the cosmos. In this early age, astronomers believe a dense fog of hydrogen gas permeated the universe, a sort of leftover haze from that primordial blast. The first galaxies blew away this fog with the powerful light that they emitted.

The galaxy in question is being seen as it was when the universe was an estimated 600 million years old, about 4 percent of its present age, researchers said. Studying such galaxies is extremely hard, they added, because they look faint and tiny in the distance; the “fog” doesn’t help.

The team of European astronomers zoned in on the object using the European Southern Observatory’s Very Large Telescope in Paranal, Chile, and examining candidate galaxies earlier identified by NASA’s Hubble Space Telescope.

“We did a quick calculation,” said Matt Lehnert of the Paris Observatory, lead author of the paper, “and were excited to find that the immense light collecting power” of the Very Large Telescope, combined with the sensitivity of its instrumentation, “and a very long exposure time might just allow us to detect the extremely faint glow from one of these remote galaxies and to measure its distance.”

After two months of analysis and testing, the team concluded that they had detected the faint glow of hydrogen at a “redshift” of 8.6. Redshift is a measure of how much the light from a given object has been stretched due to the ongoing expansion of the universe as it traveled to Earth. This in turn reveals the distance and age of the object.

One of the surprising things is that the glow from the galaxy, dubbed UDFy-38135539, seems not to be strong enough on its own to clear out the hydrogen fog, according to astronomers. “There must be other galaxies, probably fainter and less massive nearby companions... which also helped make the space around the galaxy transparent,” said co-author Mark Swinbank of Durham University in the U.K. “Without this additional help the light from the galaxy, no matter how brilliant, would have been trapped in the surrounding hydrogen fog and we would not have been able to detect it.”