Heavyweight galaxies puzzle astronomers

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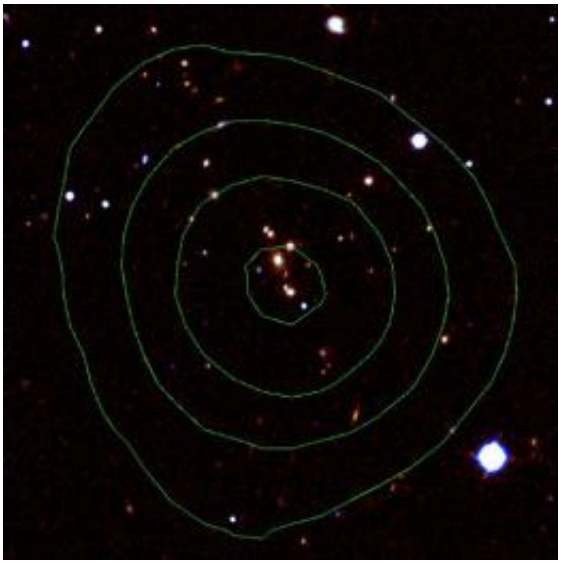

An infrared image of the cluster XMMU J2235.3-2557 taken with Subaru, seen at a distance corresponding to 65% of the way back to the big bang. The image shows the central 1.5 x 1.5 arc min of the cluster corresponding to 0.75 Mpc at this distance. The clusters X-ray emission is used to pinpoint the location of the brightest galaxy in the cluster as shown by the green contours which represent the X-ray intensity as measured by the XMM-Newton X-ray satellite.

(PhysOrg.com) -- Astronomers have discovered large galaxies some two thirds of the way back in time to the big bang. This surprising find casts doubt on theories of how the biggest galaxies form.

The conventional view is that the heaviest galaxies in the universe started out very small and light and have gained most of their weight relatively

recently by cannibalising other galaxies that came too close. However, these new findings, to be published in *Nature* on 2nd April 2009, suggest that rather than being svelte, some galaxies in the distant past weighed just as much as the monsters we see in the universe today.

The discovery was made using one of the largest optical telescopes in the World, called Subaru (named after the Japanese word for the Pleiades star cluster), located on the Island of Hawaii and owned by the National Observatory of Japan.

Analysing the light from these remote galaxies, the astronomers at Liverpool John Moores University's (LJMU) Astrophysics Research Institute have effectively weighed them and found that despite feeding on a constant diet of small galaxies, the heaviest galaxies have not increased their weight over the last nine billion years. In a universe whose age is 13.7 billion years old, these results spark a debate as to how these galaxies put on so much weight in the first few billion years after the big bang.

LJMU's Professor Chris Collins and leader of the international team of astrophysicists who made the breakthrough said: "Current predictions using simulations run on super computers suggest that at such a young age these galaxies should be only 20% of their final weight, so to find galaxies so large suggests that galaxy formation is a much more rapid process than we previously thought and perhaps the theories are missing some important physics."

Dr John Stott who carried out the analysis said: "We were surprised to find that the largest and brightest galaxies in the Universe have remained essentially unchanged for the last nine billion years, having grown rapidly soon after the Big Bang."

One possibility being considered is that the galaxies formed by the

collapse of an already massive cloud at the dawn of the universe.

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