Lifestyle - SciTech

Cosmic conundrum

BIG BUNGLE? Giant cosmic structures in the Universe way 'too big' to be compressed by traditional theories

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London: Space is festooned with vast "hyperclusters" of galaxies, a new cosmic map suggests. It could mean that gravity or dark energy — or perhaps something completely unknown — is behaving very strangely indeed, says newscientist.com.

Measurements of the cosmic microwave background radiation (CMB), the light emitted 3,70,000 years after the Big Bang, reveal only very slight variations in density from place to place.

Gravity then amplified these variations into today's galaxy clusters, which are arranged into big superclusters, with relatively empty voids in between. Traditional cosmological models say that the expansion of the universe should trump the clumping effect of gravity.

That means there should be very little structure on scales larger than a few hundred million light years across. But the universe, it seems, did not get the memo. Shaun Thomas of University College London (UCL), and colleagues have found aggregations of galaxies stretching for more than three billion light years.

The hyperclusters are not very sharply defined, with only a couple of per cent variation in density from place to place, but even that density contrast is twice what theory predicts.

Colour guide

The clumpiness emerges from an enormous catalogue of galaxies called the Sloan Digital Sky Survey, compiled with a telescope at Apache Point, New Mexico. The survey plots the 2D positions of galaxies across a quarter of the sky. To get the full picture, Thomas and his colleagues also used the colour of galaxies recorded in the survey. More distant galaxies look redder than nearby ones because their light has been stretched to longer wavelengths while travelling through an expanding universe.

By selecting a variety of bright, old elliptical galaxies whose natural colour is well known, the team calculated approximate distances to more than 700,000 objects. The upshot is a rough 3D map of one quadrant of the universe, showing the hazy outlines of some enormous structures.

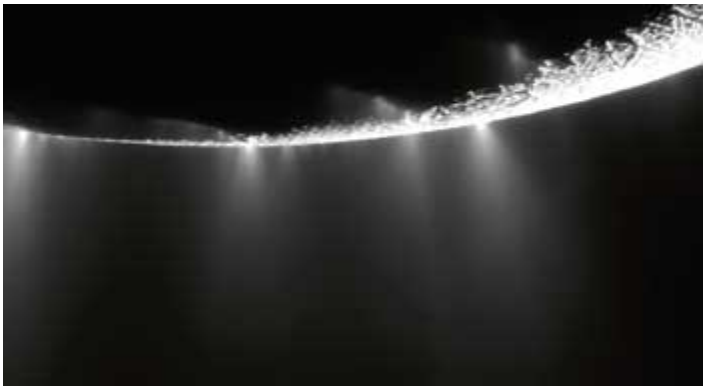
Coagulating dark energy

The result hints at some profound new physical phenomenon, perhaps involving dark energy — the mysterious entity that is accelerating the expansion of space. Yet, using colour to find distance is sensitive to observational error, says David Spergel of Princeton University.

Although the UCL team has run some checks for these sources of error, Thomas admits that the result might turn out to be the effect of foreground stars either masking or mimicking distant galaxies. Another such map reveals clumpiness on unexpectedly large scales — though not as vast as these, making it possible to believe that the universe may have a fractal structure, looking similar at all scales.

A comprehensive catalogue of spectra for Sloan galaxies is being assembled in a project called the Baryon Oscillation Spectroscopic Survey and a Dark Energy Survey will use a telescope in Chile to measure more galaxies beginning in October. Such maps might bring hyperclusters out of the haze — or consign them to the status of monstrous mirage.

Saturn's Moon ENCELADUS' salty secret



Plumes, both large and small, spray water ice from multiple locations along the famed 'tiger stripes' near the south pole of Saturn's moon Enceladus in this NASA handout photo released on June 22, 2011. The Cassini spacecraft discovery is the best evidence yet for a large-scale saltwater reservoir beneath the icy crust of Enceladus

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