The cosmic infrared background

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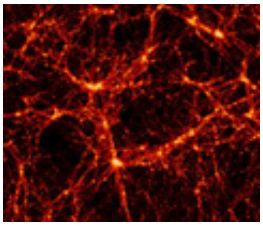

A computer simulation of the development of giant filaments of galaxies in the very early universe. Recent observations of the cosmic infrared background, the remnant radiation from many of these stars, provides support for current cosmological models. Credit: Jenkins; ApJ

(Phys.org) -- The cosmic infrared background is the collective infrared radiation emitted by cosmic sources throughout the history of the universe, including sources inaccessible to current telescopes. The latter category, for example, includes the very first generation of stars, currently a subject of intense investigations. Because of the relative uniformity of this background, which is faint and might be interpreted as instrumental noise, fluctuations in it can often be more readily discerned than the actual background level itself. This property also lets astronomers discriminate against the significant foreground contributions from the solar system and our galaxy.

CfA astronomers Matt Ashby and Giovanni Fazio joined with four colleagues to use the superb sensitivity and stability of the Infrared Array Camera (IRAC) on the Spitzer Space Telescope to probe the

cosmic infrared background. They worked with very deep IRAC images of the sky, over an area of about 0.2 square degrees, that had been taken in a different program designed to study more recently formed but still very distant galaxies.

After meticulously accounting for known stars, diffuse emission, and known galaxies, the scientists found large structural features (fluctuations) consistent with their having been produced by the first generation of stars dating from an epoch more than twelve billion years ago. These early stars, at least according to the best current models of cosmic evolution, were not uniformly distributed across space. They formed as part of stupendous, filamentary structures that evolved and grew from the tiny ripples in hot gas that pervaded the universe soon after the big bang. The results of this new paper lend support both to the current theory of the large scale structure of the universe and to our ideas about how the first generation stars formed.

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