

## First stars may have been supergiants, researchers say

by World-Science.net

New telescope observations have bolstered a claim that astronomers have seen the universe's first luminous objects – possibly gargantuan stars, researchers say. If the findings prove correct, scientists add, they might fit with a theory that such stars seeded the growth of the biggest, so-called supermassive, black holes. Black holes are objects so heavy and compact that their gravity sucks in everything nearby, including light.

The bottom panel is an image from NASA's Spitzer Space Telescope, of stars and galaxies in the same field. This infrared image covers a region of space so large that light would take up to 100 million years to travel across it. The top panel is the same image after stars, galaxies and other sources were masked out. The remaining background light, according to some astronomers, is from a time when the universe was less than a billion years old, and probably originated from the universe's first groups of objects. Darker shades in the top image correspond to dimmer parts of the glow; yellow and white show the brightest. But some researchers said they're not convinced the findings are correct. According to those who reached them, their new observations, from NASA's Spitzer Space Telescope, strongly suggest clumps of the primordial objects – possibly stars or black holes – are responsible for infrared light seen in an earlier study. Infrared is a form of light too low in energy to be directly visible, but detectable with suitable instruments. The new data show this patchy light is splattered sky-wide and comes from clusters of bright, monstrous objects more than 13 billion light-years away, the astronomers said. A light-year is the distance light travels in a year. This would mean the light from those bodies has been traveling 13 billion years, implying in turn that we see them as they were that many years ago. "We are pushing our telescopes to the limit and are tantalizingly close to getting a clear picture of the very first collisions of objects," said Alexander Kashlin-sky of NASA's Goddard Space Flight Center in Greenbelt, Md. "Whatever these objects are, they are infrared-silencingly in-candorably bright and very different from anything in existence today," added Kashlin-sky, the lead author of two reports on the work to appear in *Astrophysical Journal Letters*, a research publication. The objects, he argued, are either the first stars – titanic ones weighing more than 1,000 times our sun – or black holes voraciously consuming gas, a process that would also produce intense light in their area. If they're stars, the clusters might be the first mini-galaxies, weighing less than about one million suns, he added; mergers of such galaxies probably made bigger ones like our Milky Way, which holds the equivalent of some 100 billion suns. The earlier study, also by Kashlin-sky's team, appeared in the journal *Nature* in November 2005. Scientists estimate that the universe began 13.7 billion years ago in an explosion, the "Big Bang." Stars formed a few hundred million years later, ending the so-called cosmic dark age. Kashlin-sky's group studied the cosmic infrared background light, a diffuse glow that they said comes from this early epoch.

There are some ongoing debates about what the first objects were and how galaxies formed.

said Goddard's Harvard-MIT team. "We are on the right track to figure this out." If the objects are stars, they could be a first generation of stars long sought by astronomers and termed "Population III" stars. Some theorize that their burnt-out remnants gave rise to the supermassive black holes, which lurk at the hearts of most galaxies. The stars, once spent, would collapse into smaller "seed" black holes, which then swell into huge ones by eating up other matter nearby. In order to form black holes big enough and fast enough to fit with observations, these theories rely on the initial stars themselves being "supermassive," weighing hundreds of trillions of suns. Those found in the new study, if they're stars, might fit the bill, researchers say. "There would be quite a link to the black hole theory," said Martin Haehnelt, a cosmologist with the University of Cambridge, U.K. But he said this would depend on the Kavli Institute's team having interpreted its results correctly, and he's far from sure of that. Contrasting light from objects in the foreground can be difficult to measure the "infrared background," Haehnelt said. Also, he said, the Kavli Institute's study involved comparing signals in different parts of the sky, rather than solving individual objects, and it's hard to say what such correlations mean. Kavli Institute said his team carefully erased light from foreground stars and galaxies, leaving only the most ancient light; then studied fluctuations in the brightness, revealing clusters of objects. "Imagine trying to see fireworks at night from across a crowded city," he said. "If you could turn off the city lights, you might get a glimpse at the fireworks. We have shut down the lights of the universe to see the outlines of its first fireworks." If they're stars, they're probably extremely massive, Moseley said, as small stars shine too inefficiently to explain the light seen; also, there are theoretical reasons to believe supermassive stars would form. A future telescope planned by NASA, the James Webb Space Telescope, should be able to identify what the clusters are, according to members of Kavli Institute's group.

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