

Brightest galaxies tend to cluster in busiest parts of universe, study finds

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For more than a decade, astronomers have been puzzled by bright galaxies in the distant universe that appear to be forming stars at phenomenal rates. What prompted the prolific star creation, they wondered. And what kind of spatial environment did these galaxies inhabit?

Now, using a super-sensitive camera/spectrometer on the [Herschel](#) Space Observatory, [astronomers](#) - including a UC Irvine team led by Asantha Cooray - have mapped the skies as they appeared 10 billion years ago.

The UCI scientists discovered that these glistening [galaxies](#) preferentially occupy regions of the universe containing more dark matter and that collisions probably caused the abundant star production.

"Thanks to the superb resolution and sensitivity of the SPIRE [Spectral & Photometric Imaging Receiver] instrument on Herschel, we managed to map in detail the spatial distribution of massively star-forming galaxies in the early universe," said Cooray, associate professor and Chancellor's Fellow in physics & astronomy. "All indications are that these galaxies are... crashing, merging and possibly settling down at centers of large [dark-matter](#) halos."

This information will enable scientists to adapt conventional theories of galaxy formation to accommodate the strange, star-filled versions.

The European Space Agency's Herschel observatory carries the largest

astronomical telescope operating in space today; it collects data at far-infrared wavelengths invisible to the naked eye.

One of three cameras on Herschel, SPIRE has let Cooray and colleagues survey large areas of the sky - about 60 times the size of the full moon - in the constellations of Ursa Major and Draco. The UCI team also included Alexandre Amblard, project scientist in physics & astronomy; Paolo Serra, postdoctoral fellow; and physics students Ali Khostovan and Ketron Mitchell-Wynne.

The data analyzed in this study was among the first to come from the Herschel Multi-Tiered Extragalactic Survey, the space observatory's largest project. UCI is one of only four U.S. educational institutions involved in Herschel using the SPIRE instrument. Seb Oliver, a University of Sussex professor who leads the survey, called the findings exciting.

"It's just the kind of thing we were hoping for from Herschel," he said, "and was only possible because we can see so many thousands of galaxies. It will certainly give the theoreticians something to chew over."

The study will appear in a special issue of *Astronomy & Astrophysics* dedicated to the first scientific results from Herschel. The project will continue to collect images over larger areas of the sky in order to build up a more complete picture of how galaxies have evolved and interacted over the past 10 billion years.

Provided by University of California - Irvine

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