

techman / December 22, 2010 01:12AM

[\[Astronomy\] Academia Sinica: Monstrous Dusty Galaxies May be more Common in the Early Universe than Originally Thought](#)

[Astronomy] Academia Sinica: Monstrous Dusty Galaxies May be more Common in the Early Universe than Originally Thought ([Chinese Version](#))

Academia Sinica Newsletter (2010/12/21) Dusty galaxies existed at very early times in the history of the Universe; however, because these galaxies are heavily obscured in dust and do not emit much visible light, they have been difficult to study. Recently, an international team of astronomers used a state-of-the-art submillimeter array, which detects far-infrared radiation, to study these galaxies. They found that previous identifications of these galaxies were likely incomplete and failed to show further hidden galaxies. The project was initiated and led by Dr. Wei-Hao WANG, a Research Fellow of the Academia Sinica Institute of Astronomy and Astrophysics (ASIAA). The results were published in the international journal The Astrophysical Journal Letters on December 16, 2010.

Dusty galaxies are monstrous in energy output, and were several thousand times more luminous than our Milky Way. These galaxies are so far away from the Earth that we see them as they appeared just two to six billion years after the Big Bang. (The estimated age of the Universe is about 14 billion years.) Dusty galaxies existed in the most violent life stages of cosmic objects, either producing young stars at extreme rates, or harboring super massive black holes at their centers. All the large galaxies of today's Universe went through such stages.

The team of astronomers used the upgraded Submillimeter Array (SMA), eight 6-meter diameter radio telescopes arranged as an interferometer, to look for distant dusty galaxies. The number of dusty galaxies they found exceeded their original expectations. "Based on past observations, we expected to find two dusty objects. However, we found five," Dr. WANG said. Such a revelation led Dr. WANG and his colleagues to propose that the number of such galaxies may be more than astronomers have previously thought.

Dr. Lennox COWIE from the University of Hawaii and a co-author of the article said "our first view of these distant dusty galaxies came about a decade ago with a submillimeter camera on the James Clerk Maxwell telescope on Mauna Kea but that only gave us very blurry images. Now with these new sharper images from the SMA it seems that many of the objects we saw are actually blends of several smaller individual galaxies. This changes the interpretation quite a bit... there are more objects but they are individually smaller."

The SMA is located at the Mauna Kea Observatory in Hawaii. It contains eight radio antennas to be used together as a radio interferometer. It has the highest resolution among all submillimeter telescopes and can provide the sharpest images. It is able to detect thermal radiation from heated dust. It was recently upgraded to double its observation bandwidth and further enhance its sensitivity. The SMA is a joint project between the Smithsonian Astrophysical Observatory and the ASIAA. Academia Sinica is also a partner of the Atacama Large Millimeter/Submillimeter Array project, an even more powerful 50-element radio interferometer currently under construction in the Atacama Desert in northern Chile.

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Edited 1 time(s). Last edit at 12/22/2010 01:22AM by techman.
