

Hidden Black Holes, "Swinging" Young Universe Exposed

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for [National Geographic News](#)

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New sky surveys reveal that the early universe bustled with "promiscuous" [galaxies](#), black holes hide in galactic glare, and a star burns with unprecedented coolness.

The surveys are opening up new windows into the history and complexity of the universe—and, in some cases, pointing out blind spots in our understanding of the way things work. The discoveries were announced yesterday at a meeting of the American Astronomical Society in Austin, Texas.

Go-Go Galaxies

In its early days the universe was something of a nightclub, full of bright young things merging with wild abandon, says astronomer Shardha Jogee from the University of Texas at Austin.

Now, at middle age, it seems the party's winding down.

Jogee has been using space telescopes to observe galaxy evolution at earlier time periods than ever before.

Improvements in telescopes are allowing us to see further back in time. Since light from distant regions can take millions or billions of years to reach Earth, the events we see in images of these regions actually took place long ago.

These earlier views have shown that when the universe was only about two billion years old, 40 percent of galaxies were merging, Jogee said. Today that figure has dropped to 10 percent.

"This is basically telling you that you have fewer parties as the universe reaches midlife," she said.

(Related: ["Faint 'Teenage' Galaxies Found in Early Universe"](#) [November 29, 2007].)

Cool Brown Dwarf

Stephen Warren, an astronomer at Imperial College London, described findings that go beyond what the eye can see.

For the past two years, the United Kingdom Infra-Red Telescope in Hawaii has been scanning the heavens in the faint infrared region of the spectrum. It's the widest-ever infrared glimpse of the sky.

The new technology allows astronomers to penetrate dark clouds that hide star birth and to uncover stars much less massive and much cooler than our sun.

Our own Milky Way galaxy is transparent at infrared wavelengths, so infrared telescopes can see through to its core.

Finally, the movement of the expanding universe turns visible light from the youngest and most distant galaxies and quasars into infrared radiation. So with infrared telescopes, the youngest objects come into focus.

Warren said the infrared survey promises to yield many "serendipitous" discoveries. Already, it's revealed a brown dwarf—or very cool, low-mass star—100 degrees Celsius (180 degrees Fahrenheit) cooler than the previous record holder.

Called ULAS J0034, the star has an absolute temperature just over twice that of the Earth.

Parting the Curtains

Warren said the goal of the infrared work is to examine nearly the whole sky at the same resolution that revealed the brown dwarf. It's an ambitious project, with data releases planned every six months for the next five years.

Currently, studies of the visible universe—such as most of those made with the Hubble telescope—rule the day, having shown more about the universe than any other method.

But that may soon change.

"By 2012 we'll have detected a hundred million galaxies" using infrared methods, Warren said.

Another survey called the Sloan Digital Sky Survey, run by a team of astronomers from a wide consortium of universities and observatories, is using x-ray vision to cut through the glare of quasars—extremely bright, starlike objects—that have dominated many celestial views.

The team has found that very luminous quasars—the brightest of which outshine the Milky Way by more than a hundred times—have been stealing the show from dimmer quasars and from black holes.

It turns out that these hidden quasars make up at least half the quasars in the recent universe—and that most of the powerful black holes in our universal neighborhood have gone unseen.

With all the new surveys comes new territory for scientific study, said Shardha Jogee, who presented the study about the universe's midlife slowdown.

For example, there's a huge gap in the evolution of the universe that is yet to be described: "the gas component. We are tracing the stars, the dust even the dark matter. But the gas we don't have, and it's the gas from which you make stars," she said.

"It may be a quiet time for galaxies, but I don't think it's going to be a quiet time for astronomers."

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