Oldest known black hole reported found

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Courtesy University of Hawaii
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Astronomers have found a giant galaxy surrounding what they describe as the oldest and most distant black hole known.

The galaxy is as large as the Milky Way galaxy and harbors a "supermassive," or giant, black hole estimated to weigh the equivalent of at least a billion Suns.

A black hole is an object so compact that its gravity drags in anything that passes too close by, including light rays. Some black holes are formed from burned-out stars, but others are too large to be explained in this way and their origin is somewhat mysterious.

The newfound black hole and galaxy are measured as lying 12.8 billion light years from Earth. Since a light-year is the distance light travels in a year, that would mean that from Earth we see the galaxy as it was that many billion years ago.

It's "surprising that such a giant galaxy existed when the Universe was only one sixteenth of its present age, and that it hosted a black hole one billion times more massive than the Sun. The galaxy and black hole must have formed very rapidly in the early universe," said University of Hawaii astronomer Tomotsugu Goto, one of the researchers.

The finding is considered important in unlocking the secret of how galaxies evolved together with the supermassive black holes that most of them contain at their cores.

Until now, studying black-hole-containing host galaxies in the distant universe has been extremely difficult because the blinding bright light from near the black hole makes it harder to see the already faint light from the host galaxy.

Unlike smaller black holes, which form when a large star dies, the origin of supermassive black holes remains an unsolved problem. A currently popular model requires several mid-sized black holes to merge to form the giant black hole.

The newfound galaxy provides a reservoir of such intermediate black holes, according to Goto and colleagues. After forming, supermassive black holes often continue to grow because their gravity draws in matter from surrounding objects. The energy released in this process accounts for the bright light that these black holes produce.

To see the supermassive black hole, the team of scientists used new camera equipment installed in the Subaru telescope on Mauna Kea, Hawaii, and developed by Satoshi Miyazaki of the National Astronomy Observatory of Japan and colleagues.

"We have witnessed a supermassive black hole and its host galaxy forming together. This discovery has opened a new window for investigating galaxy-black hole co-evolution at the dawn of the universe," said Yousuke Utsumi, also of the National Astronomy Observatory.

The research is to be published in the online version of the journal *Monthly Notices of the Royal Astronomical Society* this month.