Hubble Spots Ten Supermassive Black Holes

By Greg Clark
Staff Writer
posted: 04:25 pm ET
05 June 2000

ROCHESTER, N.Y. -- A continuing search that uses the Hubble Space Telescope to find the universe's most massive black holes has turned up 10 new targets -- objects astronomers call supermassive black holes.

These enormous objects, which have masses anywhere between a few million to more than 2 billion suns, lie at the heart of many galaxies, almost appearing to be the engines that drive the galaxies themselves. The latest discoveries bring the total number of recognized supermassive black holes to 30.

Astronomers announced the results, and several conclusions that have been reached from the study of these objects, here at the meeting of the American Astronomical Society.

More Stories
- Chandra Clocks Black Hole's High Speed Winds
- Black Holes May Be Seeds from Which Galaxies Grow
- Harvard M.D.Challenges Big Bang Theory
- Australia Hops On Gamma Ray Project

Galactic bulges

For the past several years, astronomers have known that there must be a correlation between the black holes and the galaxies that surround them, but researchers have only been able to guess what that connection might be. Now as the black hole census count grows, scientists have identified certain patterns that seem to explain the relationship between black holes and their parent galaxies.

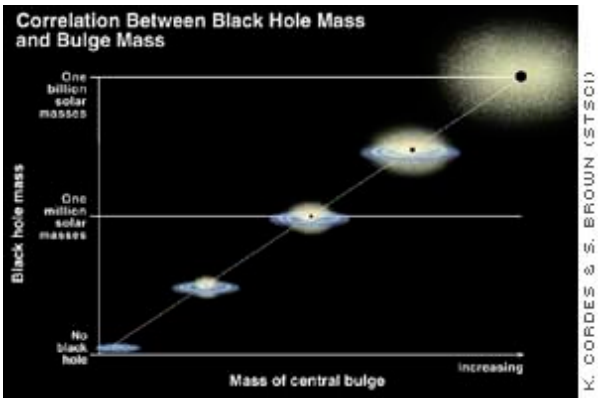
The first is that the mass of a black hole is directly correlated with the size of the bulge that swells at the center of many galaxies. These galactic bulges are huge clouds of stars that swirl around the center of a galaxy where supermassive black holes reside. Galactic bulges are found in many types of galaxies, but those that do not have bulges do not have black holes at their center, said John Kormendy of the University of Texas at Austin.

Kormendy summarized the conclusions drawn by an international team of researchers from various universities, observatories and the Space Telescope Science Institute, which operates Hubble. He said that it is now apparent that there is a definite correlation between the size of a galactic bulge and the mass of the black hole at its center.

Spinning stars

Another very direct pattern was recognized when astronomers analyzed the speed of stars spinning around black holes. They found that the speed at which stars orbited a supermassive black hole is directly related to the black hole's

mass.



"With these two correlations, we can explore the question of how black hole growth and galaxy formation are related rather better than we could before," Kormendy said.

The new analysis of the black holes and the characteristics of their parent galaxies are answering several questions that astronomers have been struggling to answer regarding the titanic "drains" that reside at the hub of many galaxies.

Only six months ago,
some astronomers speculated that black holes might be the seeds around which galaxies formed. They suggested that there was a certain chicken-and-egg problem with the black holes and galaxies, and it was possible that the black holes came first and acted as a catalyst for galaxy growth.

Now, with the new observational work, it is clear that black holes and galaxies grow in concert.

"It makes us more persuaded that there really is a connection between the collection of the material that made the bulge of the galaxy with the growth of the black hole," said University of Michigan astronomer Douglas Richstone, who has been working on this problem with Kormendy. "It's kind of intuitive that the bulge grows as the black hole grows, but we really haven't figured out how that works yet," he said.

Richstone looks forward to observations from the Chandra X-ray Observatory, currently orbiting Earth -- like Hubble -- to help answer some of the remaining puzzles. The telescope should help scientists understand how black holes accrete mass, he said.