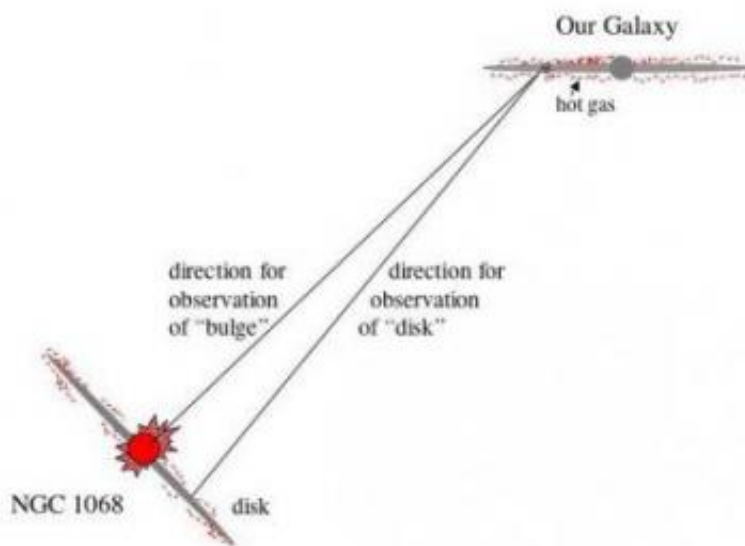


New discovery could offer clues to origins of Milky Way

June 5 2006



Observation of NGC 1068's Bulge and Disk. Credit: Robin Shelton, University of Georgia.

Spiral galaxies are the glitter of the universe. These systems of stars, dust, gas and plasma are held together by gravity but seem to pinwheel across the darkness of space. They have fascinated nighthawks for hundreds of years and dazzled scientists who use increasingly sophisticated tools to study them.

Now, for the first time, astronomers from the University of Georgia

have discovered a startling absence of hot gas being given off by the "disk" of a spiral galaxy first cataloged more than 225 years ago. The galaxy, now called NGC 1068, is younger than the Milky Way and could thus offer insights into the formation of our own spiral galaxy.

"In many ways, NGC 1068 is a window on our past," said Robin Shelton, who led the research. "What we've found is that the process of heating gas in this galaxy is more complex that we had expected."

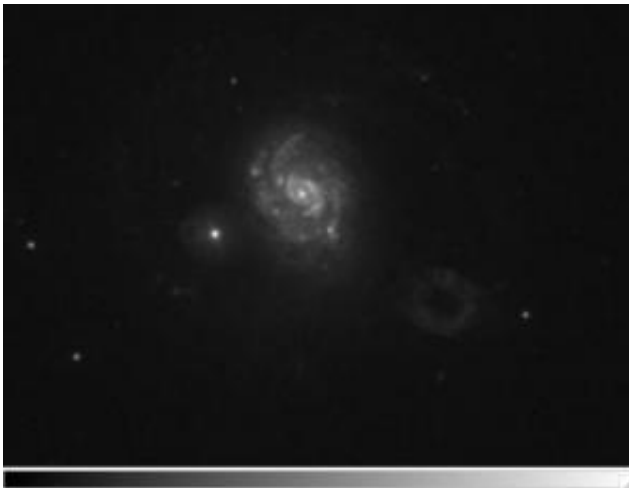


Image of NGC 1068 taken with the Optical Monitor aboard the XMM Satellite.
Credit: Robin Shelton, University of Georgia

The research was presented this week at the 208th Annual Meeting of the American Astronomical Society in Calgary, Alberta, Canada. Also assisting in the research, which was presented in a poster session, was UGA doctoral student Shinya Miyake.

Spiral galaxy NGC 1068 (hereafter "1068") is a vast 60 million light years from Earth and is moving away from us at more than a thousand miles a second. It is so bright, however, that it was first discovered in

1780, and French astronomer Charles Messier named it M 77--for the 77th body listed in his catalog of visible objects in space. Though a change in nomenclature later altered its name, it has remained the subject of study for two centuries. New tools, such as the Far Ultraviolet Spectroscopic Explorer (FUSE) satellite, launched in 1999 have allowed researchers new information on this mysterious spiral galaxy so far from Earth.

FUSE is an 18-foot-tall, 3,000-pound satellite that orbits nearly 500 miles above the Earth. It has four telescopes that can function as a single instrument and analyze light at wavelengths too short for the famed Hubble Space Telescope to see. Since its launch, it has collected science data on more 2,000 different objects in space. It was developed and is being operated for NASA by Johns Hopkins University.

"From Nov. 29-Dec. 1, 2001, FUSE observed 1068 during five different sessions, recording the data that we analyzed," said Shelton.

Some of the information from these observing sessions had been analyzed before by scientists from other universities, but that was data gathered on the "bulge" at the center of the galaxy. (If you think of a spiral galaxy as fried egg standing on end, the bulge at the center of the system would be the yolk, and the disk would be the white around it.) The data UGA analyzed is from a location in the disk of 1068 that is about the same distance as the Earth is from the center of our galaxy.

The researchers studied the emission of oxygen-6 (highly ionized oxygen, or O VI, as it is usually written) to see how much hot gas is in the disk of 1068. Extreme heat can cause molecules to break apart, and as the temperature rises, electrons can be ripped off the oxygen atoms. While normal oxygen has eight electrons, oxygen-6 only has three, but scientists know this can only occur when the surrounding temperature reaches an astounding 100,000 degrees centigrade.

"Oxygen-6 is a tracer of hot gas," said Shelton, "so examining it tells us a lot about how much gas is in these galaxies."

Because gases give off characteristic light "signatures," the team was able to use data from FUSE gathered from the disk of 1068 to analyze its emission spectrum.

Based on comparisons with our own galaxy, the astronomers had expectations about the amount of hot gas that they would find in the disk of 1068. Analysis, however, showed dramatically less than expected, and that shortage has puzzled the UGA team. There should be considerable hot gas in 1068, especially since that galaxy is a "Seyfert galaxy"--one whose center has a huge black hole, and whose energy, released around it, might be compared to millions of atomic bombs continuously exploding. In addition, 1068 has so-called "starburst regions," where enormous "bubbles" of hot gas are blown.

"We just didn't find the oxygen-6 we expected, and we're not sure of the cause," said Shelton.

This is, in fact, the first time anyone has looked for oxygen-6 emission from the extended disk so far from the center of a Seyfert galaxy. This serendipitous discovery was made while the researchers studied oxygen-6 in our galaxy.

The research also documented a "hole" in the galaxy's emissive oxygen-6 coverage, and the cause of this remains unclear as well. Shelton and her group plan to continue examining this phenomenon.

Source: University of Georgia

Citation: New discovery could offer clues to origins of Milky Way (2006, June 5) retrieved 18 April 2024 from <https://phys.org/news/2006-06-discovery-clues-milky.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.