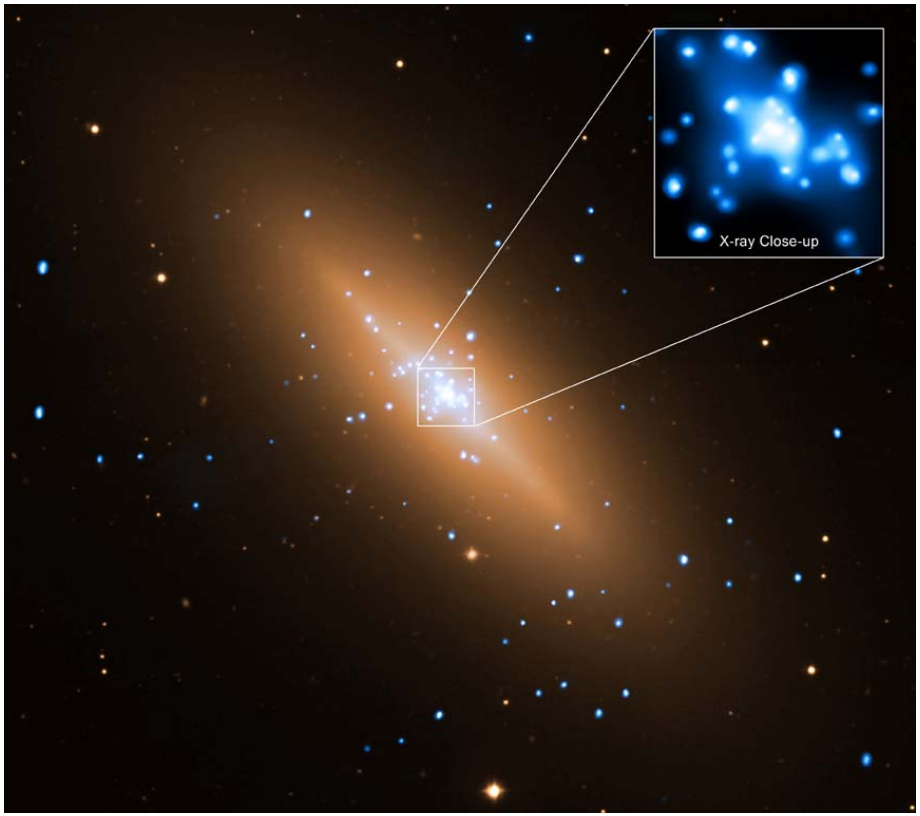
Chandra Science Highlight

Chandra Images Gas Flowing Toward Black Hole

Chandra X-ray Observatory ACIS image



Distance Estimate: About 32 million light years

Credit: X-ray: NASA/CXC/Univ. of Alabama/K.Wong et al,
Optical: ESO/VLT

The galaxy NGC 3115 is shown here in a composite image of data from NASA's Chandra X-ray Observatory (blue) and the European Southern Observatory's Very Large Telescope (VLT) (gold). The inset features the Chandra image of the central portion of a galaxy, which harbors a black hole with a mass ~2 billion solar masses.

- Inside a critical radius, called the Bondi radius, the escape velocity of gas in the vicinity of a supermassive black hole is greater than the sound speed, and gas flows toward the black hole.
- Chandra observations were used to resolve increases in temperature and density in the gas with decreasing radius inside the Bondi radius, which is estimated to be ~4 arc second for the supermassive black hole in NGC 3115.
- The analysis suggests that, for the first time, the accretion flow within the Bondi radius of a supermassive black hole has been resolved.
- The calculated accretion rate of 0.02 solar masses per year suggests that in this object the inflowing gas radiates a very small fraction of its energy (less than 1 part in 10 million) before falling into the black hole.

References: Wong, K., et al, 2011, ApJ 736L:23W, arXiv:1106.3069

JULY 2011

CXC operated for NASA by the Smithsonian Astrophysical Observatory