



Chandra Science Highlight

NGC 4649: A New Way to Weigh Giant Black Holes



Chandra X-ray Observatory ACIS image.
Scale: Image is 26 arcsec across.

Composite image of data from NASA's Chandra X-ray Observatory (shown in purple) and Hubble Space Telescope (blue) of the giant elliptical galaxy, NGC 4649, located about 50 million light years from Earth.

- The X-ray emission from NGC 4649 comes from a hot interstellar medium confined to the galaxy by the gravity of galaxy's stars and dark matter.
- The temperature profile peaks at $T \sim 11$ MK within 600 light years of the center of the galaxy.
- Under the assumption of hydrostatic equilibrium, the central temperature spike can be attributed to the gravitational influence of a quiescent supermassive black hole with mass $M = 3.4$ billion solar masses.
- This result, which is consistent with traditional techniques based on stellar kinematic studies, marks the first time that the mass of a supermassive black hole has been precisely measured based on studies of hydrostatic X-ray emitting gas.

Reference: P. Humphrey et al (2008), *Astrophys.J.*, accepted (also arXiv: 0801.3461v2)

Credit: X-ray (NASA/CXC/Univ. of California Irvine/ P. Humphre et al.): Optical (NASA/STScI)