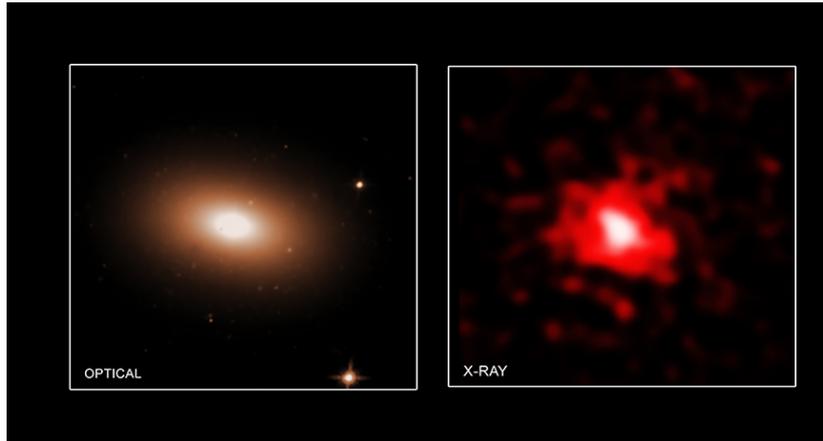




# Chandra Science Highlight

## Discovery of Hot Halos Around Massive Compact Relic Galaxies



Caption: Hubble Space Telescope (left) and Chandra (right) images of MRK 1216. The Chandra data reveal a hot (14 MK) X-ray emitting atmosphere around the galaxy.

Distance estimate: About 295 million light years (Red shift  $z=0.021328$ )

Scale: Image is about 45,000 by 43,000 light years.

Instrument: ACIS

**CXC Operated for NASA by the  
Smithsonian Astrophysical Observatory**

- MRK 1216 is an example of a “red nugget” galaxy, so-called because of its compact size and a population of predominantly old stars which give the galaxy a red color in the optical band.
- Red nugget galaxies, though fairly common ten billion years ago, mostly merged with other galaxies and are extremely rare in the present epoch.
- MRK 1216 is one of about a half dozen known surviving relic red nuggets that avoided merging with other galaxies.
- Chandra discovered X-ray emission from an extended cloud or halo around MRK 1216 and another relic red nugget.
- A massive black hole with a mass of about 5 billion times the mass of the Sun lies at the center of MRK 1216.
- Energy generated by gas falling toward this black hole probably keeps the gas hot, and suppresses the formation of new stars, accounting for the galaxy's red color.

Credit: X-ray: NASA/CXC/MTA-Eötvös University/N. Werner et al.; Optical: NASA/STScI

Reference: N. Werner et al., 2018, MNRAS, 477, 3886.  
arXiv:1711.09983



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