



Chandra Science Highlight

JKCS041: A Galaxy Cluster 10 Billion Light Years From Earth



Scale: Image is 6.2 arc min across
Chandra X-ray Observatory ACIS.

Distance Estimate: About 10 billion light years

This composite image shows X-ray emission from the hot gas in the galaxy cluster (blue) together with optical images of the individual galaxies (white).

- With an estimated redshift $z \sim 1.9$, JKCS 041 is the most distant known cluster with extended X-ray emission.
- The redshift was determined to be between 1.84 and 2.12 by fitting the optical and infrared colors in 11 wavelength bands to the spectral distribution of galaxies at various redshifts.
- The extended X-ray emission seen by Chandra shows that hot gas has been detected between the galaxies, as expected for a true galaxy cluster rather than one in the process of forming.
- The Chandra data also allowed scientists to rule out other possible explanations for the data, including a group of galaxies, or a filament of galaxies seen along the line of sight.

Reference: S. Andreon, et al. *Astron. & Astrophys.* 507 147-157 (2009)

Credit: X-ray: NASA/CXC/INAF/S.Andreon et al;
Optical: DSS; ESO/VLT