



Chandra Science Highlight

Abell 2029: A cluster of galaxies one billion light years from Earth in the constellation Serpens.



Chandra X-ray Observatory ACIS Image.

Abell 2029 is composed of thousands of galaxies (optical image, right) enveloped in a gigantic cloud of hot gas (X-ray image, left), and an amount of dark matter equivalent to more than a hundred trillion Suns.

Reference: A. Lewis et al. 2003 *Astrophys. J.* 586, 135

Credit: X-ray: NASA/CXC/UCI/A. Lewis et al.; Optical: Pal.Obs. DSS)

- If this galaxy cluster is a representative sample of the universe, the Chandra observation indicates that about 80 percent of the mass of the universe consists of dark matter – mysterious particles left over from the dense early universe that interact with each other and "normal" matter only through gravity.
- The X-ray data imply that the density of dark matter increases smoothly all the way into the central galaxy of the cluster.
- This discovery agrees with the predictions of cold dark matter models, and is contrary to other dark matter models, such as warm dark matter and self-interacting dark matter, that predict a leveling off of the amount of dark matter in the center of the cluster.