



**Chandra X-Ray  
Observatory Center**

Harvard-Smithsonian Center for Astrophysics  
60 Garden Street, Cambridge, MA 02138  
<http://chandra.harvard.edu>

**Abell 2390/MS2137.3-2353:** X-ray/Optical sets of images of two galaxy clusters located 2.5 and 3.1 billion light years from Earth respectively.

**Credit:** X-ray: NASA/IOTA/S.Allen et al., Optical: HST

In this montage, Chandra's large scale X-ray images (left) show hot gas filling the two giant galaxy clusters, while Hubble's smaller scale optical images (right) show the distribution of galaxies in the central regions of the same clusters. The Chandra data provides a detailed temperature map for the hot gas and allows astronomers to precisely determine the total masses of the clusters. Most of the mass is in the form of dark matter. The Hubble data place independent constraints on the masses of the clusters that confirm the Chandra results.

**Scale for Abell 2390:** X-ray image is 12 x 9 arcmin. Optical image is 60 x 45 arcsec.

**Scale for MS 2137.3-2353:** X-ray image is 4 x 3 arcmin. Optical image is 54 x 42 arcsec.

*Chandra X-ray Observatory ACIS Image*