



Chandra X-ray  
Observatory Center

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

Galaxy Clusters & the Hubble Constant: Six galaxy clusters with distances ranging from 1.4 to 9.3 billion light years from Earth.  
(Credit: NASA/CXC/MSFC/M.Bonamente et al.)

Caption: These six galaxy clusters are a subset of the 38 that scientists observed with Chandra ranging in distance from 1.4 to 9.3 billion light years from Earth. Astronomers studied these clusters to help determine the Hubble constant, a number that sets the expansion rate of the Universe. Both Chandra and radio observations were used to trace where photons in the cosmic microwave background interact with electrons in the hot gas that pervades the enormous galaxy clusters. These data find a Hubble constant that agrees with values determined by other techniques and fixes the age of the Universe between 12 and 14 billion years.

Scale:

Clockwise from top left, images are 4.4 arcmin, 5.6 arcmin, 4.2 arcmin, 7.6 arcmin, 8.1 arcmin, and 4.4 arcmin across, respectively.

Chandra X-ray Observatory ACIS Images

CXC operated for NASA by the Smithsonian Astrophysical Observatory