Chandra Science Highlight

Galaxy Clusters & The Hubble Constant:
Chandra Independently Determines Hubble Constant

A Combination of X-ray and radio observations allowed astronomers to independently determine the Hubble parameter, a number that describes the expansion rate of the universe.

The method used was the so-called Sunyaev-Zeldovich effect, in which the distortion of the cosmic microwave background by hot gas in a galaxy cluster is measured. This measurement is used together with X-ray observations to determine the physical size of the cluster, and thereby its distance.

Fitting cluster distances versus measured recession velocities for the sample of clusters yielded a Hubble constant of 77 kilometers per second per megaparsec (a megaparsec is equal to 3.26 million light years).

Taking into account the small uncertainties, this result agrees with the values determined by other techniques, and fixes the age of the Universe between 12 and 14 billion years.


These six galaxy clusters are a subset of the 38 that scientists observed with Chandra, with distances ranging from 1.4 to 9.3 billion light years from Earth, to help determine the Hubble constant.

Credit: NASA/CXC/MSFC/m.Bonamente et al.

CXC operated for NASA by the Smithsonian Astrophysical Observatory

AUGUST 2006