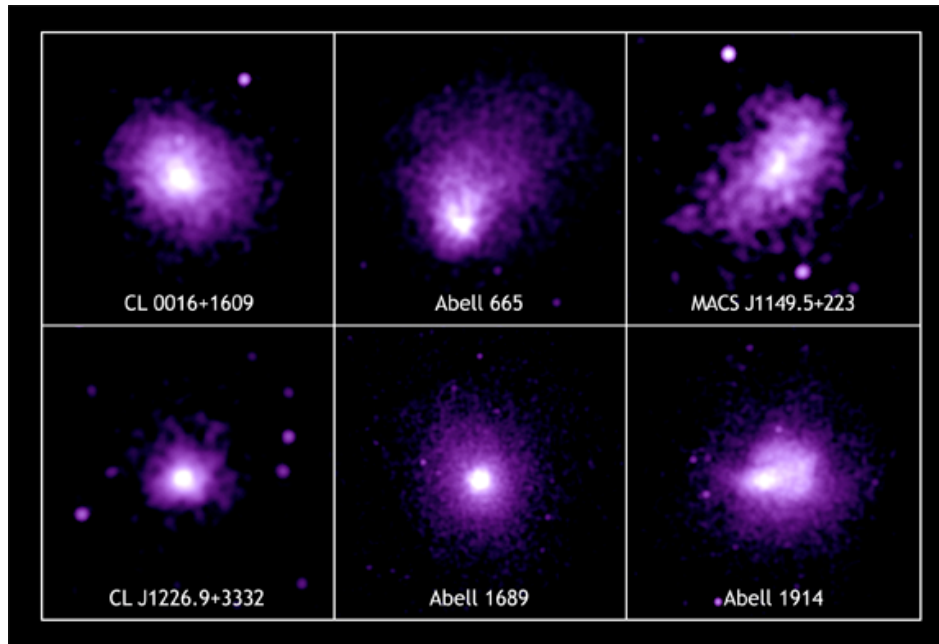




Chandra Science Highlight

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



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.

- 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.

Reference: M. Bonamente, *Astrophysical Journal*
2006 August 10 (astro-ph/0512349)