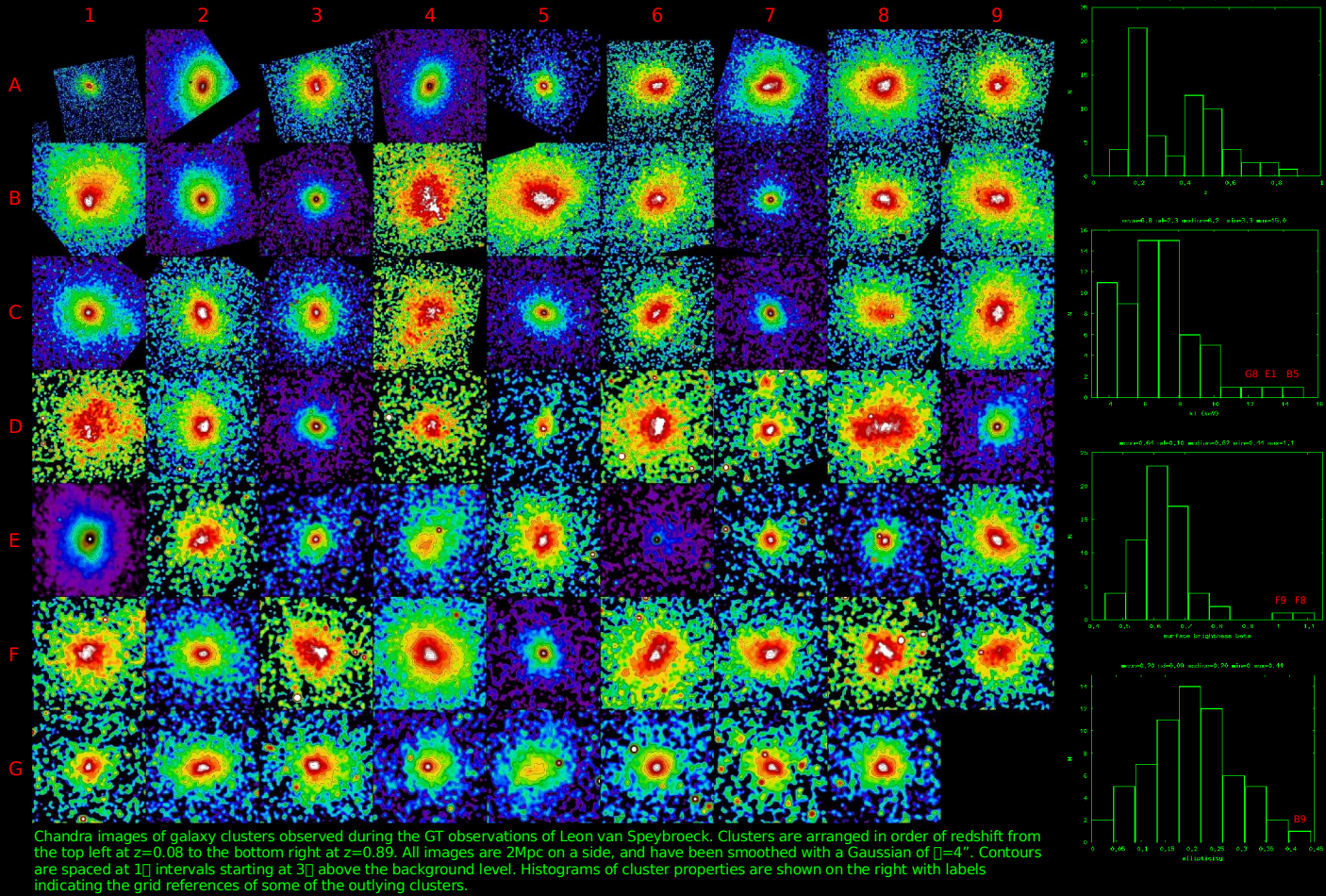# Chandra Observations of Distant Galaxy Clusters

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We present a catalogue of distant galaxy clusters observed with Chandra. The targets were observed in the guaranteed time of Leon van Speybroeck between September 1999 and August 2004. The clusters form a somewhat heterogeneous sample, having been observed for different purposes, although most were observed with the intention of combining the X-ray data with SZE observations in order to place constraints on Ω_M. We have developed an software pipeline capable of performing detailed automated analyses of Chandra observations of galaxy clusters, and are compiling a full catalogue of the properties of this rich sample.

This dataset will be used to investigate the statistical properties of clusters, the cluster scaling relations, and the relationships between cluster properties and morphology. In the future, we will extend the sample to include all suitable Chandra cluster observations, and data products (e.g. Surface brightness contours) will be made publicly available.


Chandra images of galaxy clusters observed during the GT observations of Leon van Speybroeck. Clusters are arranged in order of redshift from the top left at z=0.08 to the bottom right at z=0.89. All images are 2Mpc on a side, and have been smoothed with a Gaussian of =4". Contours are spaced at 1 intervals starting at 3 above the background level. Histograms of cluster properties are shown on the right with labels indicating the grid references of some of the outlying clusters.

The sample comprises 97 observations of 67 galaxy clusters in the redshift range 0.08<z<0.89 (median z=0.37), most of which are shown in the grid above. Highlights of the sample include:

* **Relaxed clusters:** A1413 (A2) and A2261 (C1) are examples of relaxed clusters with cooling cores.
* **Very hot clusters:** The hottest clusters in the sample are A2163 (B5; 15.0 keV) and RXJ1347.5-1145 (E1; 13.9 keV). While A2163 is disturbed, RXJ1347.5-1145 is relaxed, with a cooling core and is the most X-ray luminous cluster known.
* **Merger activity:** A1682 (C4) is associated with at least 2 X-ray clumps to the South East at the same redshift, and A781 (D1) has a disrupted core and a probable second X-ray clump to the West.
* **Core motion:** A665 (B1), which is known to have a shock front (Markevitch & Vikhlinin 2001), and A2099 (A3) are examples of clusters with evidence for motion in the cores, indicative of late-stage mergers.

Dependence of spectral uncertainties on signal to noise:
Using the large number of clusters in the sample we were able to investigate the dependence of the uncertainties on the best-fitting parameters of a single temperature APEC plasma model on the signal to noise ratio of the spectral data.
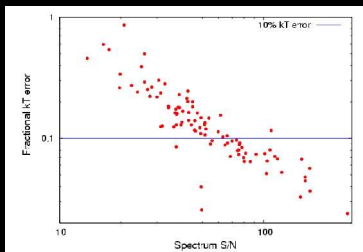
A S/N ratio of ~60 in a spectrum is required to achieve 10% errors on kT

The same S/N ratio gives ~50% errors on metal abundance.