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XMM Observation of the Galaxy Cluster Abell 514

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Abstract. We present XMM-Newton observations of the galaxy cluster Abell 514. This cluster shows a very complex X-ray morphology. Radio observations show that there are six radio sources located inside the cluster. This makes it possible to determine the magnetic field strength using the Faraday rotation method. This cluster is an example for the hierarchical growth of structure and a very interesting object for studying the correlation between magnetic field strength and X-ray properties.

Keywords. cluster of galaxies, XMM-Newton, complex morphology

1. Results

Abell 514 was observed with the EPIC cameras on-board XMM. The data was analysed using the Science Analysis Software (SAS). All the X-ray point sources in the field of view were cut out to study only the extended cluster emission.

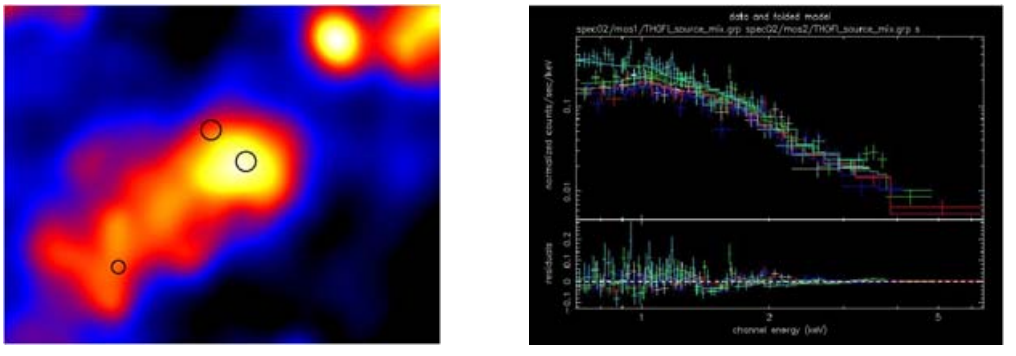

Figure 1. The galaxy cluster A514 as seen with XMM-Newton. The first image shows the main part of the cluster. The substructure rich morphology can be seen. The circles are at the position of the radio sources. The second image shows the spectrum that has been extracted from this area.

The XMM-Newton images reveal the complex morphology of the cluster. It consists of a main clump with an elliptical shape on top of an elongated structure, including different smaller sub clumps (see figure 1, first image). The location of three radio point sources that lie inside the XMM field of view are indicated in figure 1. The magnetic field strength in the cluster center has a value of 3-7 μG (Govoni *et al.* 2001). If the elongated structure in the South-East is excluded the surface brightness profile of the main clump can be approximately fitted with a single beta profile with a beta of 1.98. For the whole cluster, an X-ray spectrum could be extracted (see fig 1, second image) and an overall temperature of the cluster (2.9 to 3.5 keV) as well as a cluster metallicity (0.05 to 0.25 solar abundance) was calculated.