

"PIN"-ning Down a Nonthermal Component in the Hard X-ray Emission  
of the Coma Cluster with Suzaku HXD/XIS and XMM-Newton Observations

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The brightest radio halo known resides in the Coma cluster of galaxies,  
which is also the X-ray brightest non-cooling core cluster.  
The diffuse, cluster-wide radio halo is due to synchrotron emission  
from relativistic electrons, which also produce inverse Compton emission  
that becomes competitive with thermal emission from the ICM at hard X-ray  
energies. Thus far, claimed detections of this emission in the Coma  
cluster are controversial (Fusco-Femiano et al. 2004; Rossetti &  
Molendi 2004). In this poster, we present a 180 ks observation of the Coma  
cluster with Suzaku, in order to nail down its nonthermal hard X-ray  
content, as well as a mosaic XMM-Newton observation that covers  
the entire HXD-PIN field of view. Because Coma's ICM is hot ( $T \sim 8$  keV),  
a clear detection of nonthermal emission in the HXD-PIN detector requires  
the thermal component within the same field of view to be completely  
censused. XMM-Newton EPIC-PN spectra over the HXD field of view are  
weighted according to the spatial sensitivity of the HXD-PIN detector  
and combined so as to directly represent the HXD-detected thermal emission.  
The Suzaku HXD-PIN and XIS spectra are simultaneously fit with this  
XMM-Newton spectrum to pin down the thermal and nonthermal components of  
the X-ray emission. Combined with radio observations, the level of  
nonthermal emission will constrain the strength of the cluster-wide  
magnetic field and the relativistic energy content of the Coma cluster.  
These results will be interpreted within the framework of relativistic  
particle re-acceleration, driven by cluster mergers, as the origin  
of radio halos. Also, the hard X-ray thermal emission will be discussed  
in light of previous results, including recent INTEGRAL observations  
(Eckert et al. 2007).