

Suzaku view of the cluster pair Abell 222/223

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Previous XMM-Newton observations of Abell 222/223 reveal a large-scale filament connecting the clusters, which is further verified by weak-lensing data. This cluster pair is also implied to be pre-merger. Therefore this filament was claimed to represent relatively pristine warm-hot intergalactic gas, before being processed by the cluster's interaction.

We analyzed the Suzaku archival data of the Abell 222/223 cluster pair to investigate the properties in the outskirts and the filament regions. We used Chandra data to reveal the surface brightness profile of clusters and to constrain the Cosmic X-ray Background. For the Suzaku analysis, we carefully modelled the scattered light from the two clusters into the filament region using ray tracing.

Both the Chandra surface brightness profiles and the Suzaku temperature and density profiles suggest that there are no obvious shocks at the clusters' outskirts, in agreement with previous results. Even though consistent within the large error bars of the initial XMM measurement (0.91 ± 0.25 keV), the temperature of the filament measured by Suzaku appears to be higher, around 1.74 ± 0.22 keV. The emission measure of the filament at $0.3Z_{\odot}$ is $1.37 \pm 0.11 \times 10^{65} \text{ cm}^{-3}$, perfectly consistent with the XMM measurement ($1.3 \times 10^{65} \text{ cm}^{-3}$). The higher instrumental background and susceptibility from soft proton contamination in the XMM-Newton data could be responsible for this difference in the temperature measurements. Given the best-fit values from Suzaku, it seems possible that the excess emission is due to a superposition of the cluster outskirts, rather than pristine WHIM as initially claimed.

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