Chandra & JVLA Observations of the Frontier Cluster MACS J0717.5+3745

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Previous work:
Medezinksi+2013; Jauzac+2012; Ma+2009; Zitrin+2009; Ebeling+2007; Ebeling+2004; Edge+2003

\bullet \ z = 0.5458
\bullet \ L_{X (0.5-2.0 \text{ keV})} = 2.5 \times 10^{45} \text{ erg s}^{-1}
\bullet \ T= 11.6 \text{ keV}
\bullet \ M_{\text{vir}} = 3 \times 10^{15} \text{ M}_\odot
\bullet \ Quadruple \ merger \ event
\bullet \ \sigma_V = 660 - 1760 \text{ km s}^{-1} \ (for \ the \ subclusters)
\bullet \ Hints \ of \ shock \ heated \ regions: \ 
\text{~20+ keV}
CHANDRA

243 ks - 0.5-2.0 keV - 1” pixels

Smoothed Image

- Very disturbed morphology
- Filament extending to the south-east
• Very hot cluster: $kT > 20$ keV in the merger region!
Radio observations:
• 850 kpc radio relic
• 1.5 Mpc radio halo
implies: cluster-wide population of cosmic rays and magnetic fields

Most luminous radio source (halo + relic) in the sky
JVLA (2-4 GHz), Chandra (0.5-2 keV), HST (ACS)
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foreground FRI source (z=0.15)

NAT galaxy (falling into the cluster along a filament)

Narrow Angle Tail (NAT) galaxy (in cluster)

Radio Relic

forefront FRI source (z=0.15)
Summary

• Very disturbed morphology, indicative of several mergers

• Extremely hot ICM (kT > 20 keV) due to the merger

• Morphology suggests a connection between relic and NAT source

• Relic traces shock heated ICM

• Supports shock re-acceleration scenario