

Characterizing low-z clusters with the CEREAL sample

Laurel White

Overview

The need for a low-z anchor

About the CEREAL sample

- Morphology analysis
- Cool core analysis

Future work



The need for a low-z anchor



McDonald et al. 2017



Ruppin et al. 2021



The need for a low-z anchor



McDonald et al. 2017



Ruppin et al. 2021



The need for a low-z anchor

 ACCEPT (Archive of Chandra Cluster Entropy Profile Tables) (Cavagnolo et al. 2009)

Published in 2009

- Covered most known clusters at the time
- REFLEX (ROSAT ESO Flux-Limited X-ray) cluster sample (Schuecker et al. 2003)

• 0 < z < 0.3

- REXCESS (Representative XMM-Newton Cluster Structure Survey) (Böhringer et al. 2010)
 - X-ray flux-limited selection from REFLEX
 - * 0.055 < z < 0.183
- CCCP (*Chandra* Cluster Cosmology Project) (Vikhlinin et al. 2009)
 - Selected from ROSAT
 - ✤ Low-z sample w / z ~ 0.05 is X-ray flux-limited



CEREAL sample selection

- CEREAL: Cluster Evolutionary
 Reference Ensemble At Low-z
- 108 clusters selected in M + z from PSZ2
- Low-z anchor for evolutionary studies of cluster demographics in the era of SPT-3G



CEREAL sample selection

- CEREAL: Cluster Evolutionary
 Reference Ensemble At Low-z
- 108 clusters selected in M + z from PSZ2
- Low-z anchor for evolutionary studies of cluster demographics in the era of SPT-3G





Chandra follow-up

- 61 archival and 47 new observations
 - Finishing in August
- Aiming for a minimum of ~2000 counts per cluster
 - Short (~few ks) exposures for each observation

Observing the Universe at millimetre wavelengths, June 26-30, 2023, LPSC Grenoble



PSZ2G287.96-32.99

































Measuring the cool core fraction with c_{SB}

- Definitions (Santos et al. 2008):
 - Moderate cool cores:
 0.075 < concentration < 0.155
 - Strong cool cores:
 0.155 < concentration





Future work

- Further demographics studies, including: *
 - What are the average thermodynamic profiles? •
 - What is the average metallicity? *
 - What is the inner slope of the universal pressure profile? *
 - What fraction of our clusters are sloshing? *
 - What is the distribution of BCG offsets? •



Future work

- Coincident radio data will allow us to look at:
 - Radio-loud central BCGs
 - X-ray cavities produced by AGN feedback





Future work

 eRosita will get ~5000 counts for each of these clusters





Conclusion

We are characterizing low-z galaxy clusters via thorough follow-up and a uniform analysis to provide an unbiased view of the local universe

We are giving context for evolutionary studies as we push out to observing galaxy clusters at their formation

