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Constraining The Thermal History of Groups and Clusters with the Sunyaev-Zel'dovich Effect

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Energetic feedback from active galactic nuclei (AGNs) is often invoked to explain the thermal properties of galaxy groups and clusters, and to resolve several outstanding issues in galaxy formation, but its impact is still not fully understood. AGN feedback may have been gradual, occurring mostly during periods of lower accretion rates, as observed in cool core clusters today, or it may have been dominated by powerful outbursts that occurred when supermassive black holes were more rapidly accreting. The most promising methods for distinguishing between these models is by looking for cosmic microwave background (CMB) anisotropies due to the thermal Sunyaev–Zel'dovich (tSZ) effect. I will describe our analysis of this effect in South Pole Telescope and Atacama Cosmology Telescope data to constrain the gas around massive galaxies at z~1 at a resolution of ~ 500 comoving kpc, and I will also present our analysis of data from the TolTEC instrument, which constrains feedback on scales of ~ 50 comoving kpc. Future such measurements will continue to provide essential information on the thermal history of groups and clusters.

Author: SCANNAPIECO, Evan (Arizona State University)

Presenter: SCANNAPIECO, Evan (Arizona State University)

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