

## Simulated X-ray Emission in Galaxy Clusters with AGN Feedback

*Monday, 7 September 2020 13:12 (7 minutes)*

Several studies suggest that active galactic nuclei (AGN) play a significant role in the cosmological evolution of their host galaxies and dark matter halos. There is considerable evidence that the formation and evolution of the central AGN and the diffuse gas in the halo are coupled together by the activity of the supermassive blackhole (SMBH), usually termed as AGN feedback in the literature. To investigate this effect, we study the diffuse X-ray emission from galaxy groups and clusters by coupling the Astrophysical Plasma Emission Code (APEC) with the highest resolution cosmological hydrodynamic simulation involving feedback from AGN. We then construct a statistical sample of synthetic Chandra X-ray photon maps to observationally characterize the effect of AGN on the surrounding medium. By examining the flux and photon maps, we validate a recently used technique of X-ray stacking to study the effect of feedback on the intra-cluster medium (ICM) from high redshift AGN. Our results show that AGN are indeed effective in displacing the hot X-ray emitting gas from the centers of groups and clusters, and that these signatures remain evident in observations of the X-ray surface brightness profiles. Through this study we provide a robust method to extract the fraction of total energy output of the AGN that couples to the surrounding gas as feedback. This technique is applied to 200 ks Chandra X-ray observations of the ICM. We further discuss this detection feasibility in the light of current and upcoming X-ray missions.

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**Session Classification:** COSMOLOGY, DE, DM, COMPACT STARS, NSs, BHs, GWs, GRAVITY