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The influence of Dynamical state on Scatter in Galaxy Cluster Mass-Observable Relations HSIANG-YI YANG, PAUL RICKER, UIUC
— Clusters of galaxies, as the most massive bound objects in the universe, are sensitive probes of the cosmological parameters. Determination of cluster mass is crucial and often relies on scaling relations between cluster mass and observables, such as X-ray temperature, X-ray luminosity, etc. Therefore, systematic bias and scatter in these relations have to be studied carefully both for cosmological purposes and for understanding complicated cluster physics. The dynamical state of clusters is one possible source of scatter, because most clusters are formed only recently by merging small galaxies or groups and many of the unrelaxed ones still show disturbed morphology in high-resolution X-ray images. In our work, we simulate galaxy clusters in cosmological simulations with dark matter particles and gas. We follow the actual cluster merging histories to quantify the dynamical state of clusters. To compare with observations more directly, we also produce mock Chandra images and extract X-ray observables in the same way observers do. These analyses allow us to examine the contribution of dynamical state on scatter in cluster mass-observable relations.

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