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The 300th-NIKA2 LPSZ twin samples: synthetic clusters to support real observations

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Twin samples of synthetic clusters of galaxies with properties close to the targets of the NIKA2 Large program Sunyaev-Zeldovich effect (LPSZ) have been generated from the 300th simulations database. This Large SZ Program is observing a selection of galaxy clusters at intermediate and high redshift ($0.5 < z < 0.9$), covering one order of magnitude in mass, with the NIKA2 camera at 30-m IRAM radiotelescope. These are SZ-selected clusters from the Planck and Atacama Cosmology Telescope (ACT) catalogs, where the selection is based on their integrated Compton parameter values, Y_500.

The Three Hundred hydrodynamical simulations provide us hundreds of clusters satisfying these redshift, mass, and Y_500 requirements. This catalog exploited a large sample of simulated galaxy clusters with their environment modelled using a range of simulation packages and physics modules. In addition to the standard post-processing analysis, mock observational maps are available mimicking X-ray, optical, gravitational lensing, radio, and SZ observations.

The primary goal of employing the twin samples is to compare different cluster mass proxies from synthetic X-ray emission, Sunyaev-Zel'dovich effect and optical maps (by galaxy members velocity dispersion and lensing k-maps). We can then verify the impact that a limited sample of only 50 objects, could have on the final results. Scaling laws will be cross-correlated to reduce the scatter on the inferred mass and the mass bias will be related to various physical parameters.

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