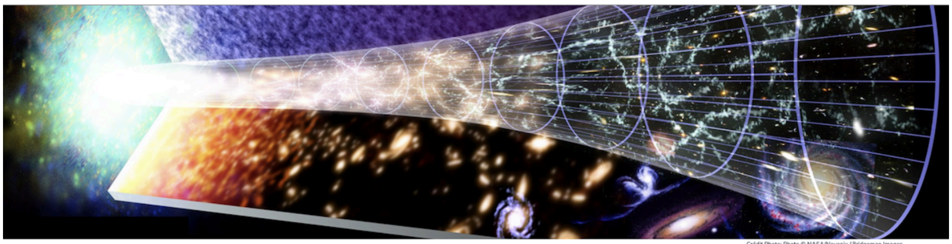

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Constraining the mass and redshift evolution of the hydrostatic mass bias using the gas mass fraction in galaxy clusters

jeudi 19 janvier 2023 11:30 (20 minutes)

"The gas mass fraction in galaxy clusters is a convenient probe to use in cosmological studies, as it can help derive constraints on a collection of cosmological parameters. It is however subject to various effects from the baryonic physics inside galaxy clusters, which may bias the obtained cosmological constraints. Among different aspects of the baryonic physics, in this presentation I focus on the impact of the hydrostatic equilibrium assumption. I analyse the hydrostatic mass bias B, constraining a possible mass and redshift evolution of this quantity and its impact on the cosmological constraints. To that end I consider cluster observations of the Planck-ESZ sample and evaluate the gas mass fraction using X-ray counterpart observations. I show a degeneracy between the redshift dependence of the bias and cosmological parameters. In particular I find a 3.8σ evidence for a redshift dependence of the bias when assuming a Planck prior on Ωm. On the other hand, assuming a constant mass bias would lead to the extreme large value of Ωm > 0.860. I however show that these results are entirely dependent on the cluster sample I consider. In particular, the mass and redshift trends that I find for the lowest mass-redshift and highest mass-redshift clusters of our sample are not compatible. Nevertheless, in all the analyses I find a value for the amplitude of the bias that is consistent with B ~ 0.8, as expected from hydrodynamical simulations and local measurements, but still in tension with the low value of B ~ 0.6 derived from the combination of cosmic microwave background primary anisotropies with cluster number counts."

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