CAPSEN Exit Report

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One of the targets of the precision cosmology era is be able to pin down the total mass of the Standard Model neutrinos using cosmological observables from many current and upcoming surveys, like the DES, HSC, WFIRST, EUCLID, and LSST. To achieve this target, a thorough understanding of structure formation in massive neutrino cosmologies is essential. It has been established that neutrino produce a characteristic damping of the matter power spectrum on small scales, compared to cosmologies without massive neutrinos. However, the presence of massive neutrinos also produce more subtle signatures, such as making the bias of Dark Matter halos scale-dependent on linear scales. In Standard ΛCDM cosmology, the halo bias is expected to be independent of scale on linear scales. Further the shape of the scale dependence is unique, and set by the transfer function of the neutrinos, which for the SM neutrinos, depends only on their mass.

constraints on SIDM from these measurements are already quite competitive with those coming from merging cluster systems like the Bullet Cluster. In a few years, as lensing measurements go to higher signal to noise due to more clusters being observed, this method will provide one of the tightest constraints on SIDM.