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Implementing MaVaNs Cosmology

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It has been shown that mass varying neutrinos (MaVaNs) can act as a negative pressure and hence are a candidate for dark energy.However MaVaNs also allow for higher Σm_ν than terrestrial bounds, giving late forming warm dark matter. In this paper we implement MaVaNs cosmology using CMBEASY to study the effect of MaVaNs cosmology on the CMB spectrum. The MaVaNs parameter space explored is one with a light acceleron. We find that the CMB spectrum is not aftected except at very low multipoles. Cosmic variance and large error bars for low l measurements allow for significant warm dark matter at late times. This implies that MaVaNs cosmology can give different results for σ_8 as determined by CMB vs structure formation. We find that we can reduce the tension between σ_8 as reported by Planck Collaboration XX without increasing the tension in Hubbles constant measured by Planck. We also put approximate upper bound on neutrino mass today for a MaVaNs theory, by comparing the quadropole mode in the temperature power spectrum with data.

Summary

I will show that MaVaNs do not significantly affect the temperature spectrum but their mass and energy density become important at late times leading to warm dark matter. The only cosmological parameter it has effect on is H_0 and σ_8. I will show that one can obtain a significantly smaller σ_8 without changing H_0 and hence MaVaNs are a possible solution to the Planck σ_8 discrepancy. I also will put loose upper bounds on Σm_ν based on the quadropole moment in the CMB spectrum.

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