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Constraining the total neutrino mass with the power spectrum

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While neutrino oscillation experiments achieved high precision measurement on the neutrino squared mass differences, the absolute scale and hierarchy are still unknown. On the cosmology side, massive neutrino's transition from a relativistic to a non-relativistic specie leaves an imprint on the Cosmic Microwave Background (CMB) temperature power spectrum, allowing for tighter constraint on the sum of the masses. Moreover, because of their high thermal velocity dispersion, even at late times, cosmological neutrinos free stream through gravitational potential wells, provoking a damping of the CDM clustering on scales smaller than their free streaming scale. This damping will be imprinted in the galaxy power spectrum, making it a probe of choice to estimate the total neutrino mass. In this talk I will present my results on the estimation of neutrino masses with the real space power spectrum of the DEMNUni (Dark Energy and and Massive Neutrino Universe) simulations. I tested different models of the non-linear power spectrum as well as several methods to estimate the covariance matrix of this observable, to achieve accurate and precise constraints on the total neutrino mass together with other cosmological parameters.

Auteur principal: GOUYOU BEAUCHAMPS, Sylvain (CPPM)

Orateur: GOUYOU BEAUCHAMPS, Sylvain (CPPM)

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