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CMB Temperature Spectrum considering massive neutrinos in ΛCDM

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The Cosmic Microwave Background (CMB) is an open window to the early Universe. To compute the CMB Spectrum we need to perturb the FLRW universe since our universe is no longer homogeneous and isotropic at small scales. Furthermore, the interaction between photons and electrons induces a perturbation in the photons temperature. This interaction can be described by the Boltzmann equations. Solving these equations we can find the CMB Temperature Power Spectrum. On the other hand, observations from both the sun and our atmosphere strongly suggest that neutrinos have mass. In this work, we will show how we can compute the quantities that describe the current percent of matter density, energy density and shape of the universe for ΛCDM considering massive neutrinos in comparison with the standard model ΛCDM .

Authors: Mr CALDERON CORDOVA, CRISTHIAN (UNIVERSIDAD NACIONAL DE INGENIERIA); Mrs ESCAMILLA-RIVERA, CELIA (INSTITUTO DE CIENCIAS NUCLEARES)

Presenter: Mr CALDERON CORDOVA, CRISTHIAN (UNIVERSIDAD NACIONAL DE INGENIERIA)

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