## NuCo 2021: Neutrinos en Colombia



Contribution ID: 34

Type: not specified

## Neutrinos in cosmology: Challenges and future perspectives

Thursday 29 July 2021 15:00 (20 minutes)

Neutrinos are not only a cornerstone of particle physics but also for cosmology. From the point of view of particle physics, neutrinos are fundamental particles (specifically neutral leptons), which in principle come in three flavors ( $\nu_e$ ,  $\nu_\mu$ ,  $\nu_\tau$ ) and have the property that they can be transformed into each other (Oscillations). Due to this property, it is well known that neutrinos have mass (very, very small), which goes beyond the standard model of particle physics. However, its absolute mass scale is still a mystery, along with other properties such as hierarchy between them (normal, inverse, or degenerate ordering) and if they are Dirac or Majorana particles (Neutrinos / Anti-Neutrinos are the same particle?). On the other hand, from the point of view of cosmology, neutrinos are the second most abundant species in the Universe after photons, which implies that they can considerably affect the dynamics of cosmology (which is complementary information for particle physics) and how can use them to alleviate tensions between measurements of parameters such as  $H_0$  and  $\sigma_8$ . In addition to this, I will show what are the perspectives for future experiments such as CMB-S4, CORE, and Vera Rubin LSST observatory, through forecast and large-scale structure simulations.

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