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## Leptophilic $Z'$ model: Hubble tension and CMB constraints

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The introduction of right-handed chirality partners for neutrinos allows the calculation of deviations in the effective number of degrees of freedom in the early universe, which could be probed by new observations like CMB-SO4 or Planck+BAO. The presence of these sterile neutrinos can be useful when proposing dark matter candidates and when different physical phenomena such as the matter-antimatter asymmetry are discussed. Moreover, the introduction of a new neutral interaction could explain the mechanism of thermalization of these new light-particles, while inducing a chiral anomaly free theory. We motivate a leptophilic to the  $\mu$  and  $\tau$  flavors  $Z'$  model with the introduction of an even number of right-handed chirality partners; providing a useful and compatible model both in particle physics and cosmology. We study the perturbative effects of these new particles in the Cosmic Microwave Background spectrum, showing that deviations from the  $\Lambda$ CDM model are most important in the small-angle region of the temperature multipolar expansion. The effects of this model in the Hubble parameter are discussed, concluding that a light improvement in the Hubble tension is obtained.

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