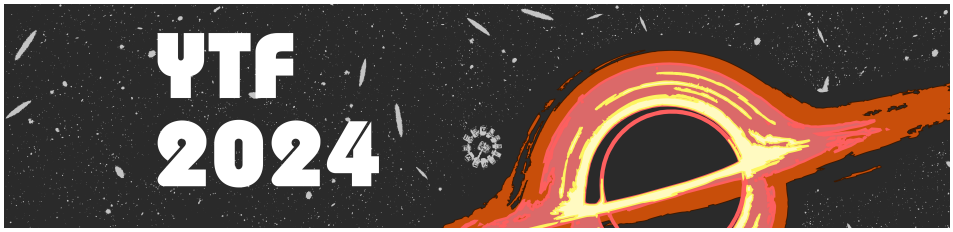

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Lower Mass Bound on Neutrino Mass for Leptogenesis from Dark Matter with large coupling Hierarchy

Wednesday, 18 December 2024 16:40 (30 minutes)

Davidson and Ibarra showed that for successful matter anti-matter asymmetry generation from extending the Standard Model to include Dirac and Majorana Neutrino mass contributions, the lightest Right Handed Neutrino (RHN) mass possible is 10^9 GeV, known as the Davidson Ibarra (DI) bound. Falkowski et al introduced a new interaction to this standard Leptogenesis model resulting in two sector Leptogenesis from dark matter. This involves asymmetry generation in both the visible sector and the new dark sector from which the dark sector has two new couplings from Heavy RHN's. They show that the DI bound of 10^9 GeV is still not broken. This presents a problem as a large RHN mass contributes to the electroweak hierarchy problem; lowering it alleviates this tension. The point below which this tension is alleviated is approximately 3×10^7 GeV also called the Vessani bound. However, the effect of a very large hierarchy in the dark sector couplings has not been studied. We have explored the effect of large hierarchy in the dark couplings. We found that the RHN mass can be lowered from 10^9 GeV to approximately 3×10^7 GeV. Washout prevented it from going lower. However, after further exploration of the effects of washout suppression from a large dark scalar mass we found that the mass of the lightest RHN is at 5×10^4 GeV.

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