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Flavored Leptogenesis with MeV–GeV Dark Matter

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We explore flavored resonant leptogenesis embedded in a neutrinophilic 2HDM. The mass pattern of the right-handed neutrinos~(RHNs) is generated by invoking a softly broken U(1) lepton family number difference symmetry. Such a symmetry features two degenerate heavy RHNs and a massless one. The soft breaking then generates a small splitting between the two heavier one, while also generating mass for the lightest one. If the heavier two RHNs are at TeV scale, the resulting spectrum for the lightest one is naturally placed at MeV–GeV mass, lies below the sphaleron freeze-out temperature and is stable, serving as a dark matter candidate – another feature that conventional leptogenesis can not accomodate. On the other hand, the heavier two enable TeV-scale leptogenesis also avoids the extreme mass degeneracy typically plagued conventional resonant leptogenesis.

Baryon asymmetry, neutrino masses, and potentially even dark matter relic density can be addressed within a unified, experimentally testable framework, shedding light onto matter-dark matter coincidence puzzle.

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