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Status of singlet-doublet fermion dark matter

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Irrefutable evidences from galaxy rotation curve, gravitational lensing and large scale structure of the Universe suggest that the present Universe is dominantly filled by an invisible matter, popularly called dark matter. In fact, the satellite based experiment PLANCK predicted that the relic density of dark matter, expressed in terms of Ω_Dm hˆ2=0.12±0.0012. However, the dark matter component of the present Universe can not be explained by the current standard model (SM) of particle physics. This implies one has to explore physics beyond the SM. A SM singlet fermion DM (χ) has been explored extensively and found that it is over produced in order to be compatible with the current direct detection limit. On the other hand, an inert fermion doublet DM (ψ) is under produced in order to be compatible with the direct search constraint. However, a combination of a singlet and a doublet fermion with appropriate mixing give rise a good candidate of DM, which not only satisfy the current direct search constraints but also give the correct relic in a large parameter space. In a series of paper (1510.02760, 1704.03417, 1812.06505, 2009.00885,2112.06847, 2204.09671,2310.03721) we explored the compatibility of singlet-doublet fermion dark matter with neutrino mass, g-2 anomaly, W-mass anomaly and ΔN_eff. In this talk a summary of these results will be reported.

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