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Thermal leptogenesis in the type-I Dirac seesaw extension to the DFSZ axion model for dark matter

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The type-I Dirac seesaw extension is made to the DFSZ axion model, where light active neutrinos are Dirac particles and acquire mass through the
canonical seesaw mechanism after the Peccei-Quinn and electroweak symmetry breaking, finding that neutrino mass is given by m_{\nu} ≈ ⊠⊠{⊠}/Λ{⊠⊠},
result which relates the three energy scales involved in the model: the mass of the heavy sterile Dirac fermions introduced (Λ{⊠⊠}), Peccei-Quinn scale
(⊠{⊠}), and electroweak scale (⊠). As a consequence, it was found that 10ˆ(3)*⊠{⊠}
ˆΛ{⊠⊠}, hence neutrino Yukawa coupling associated to the QCD axion,
candidate to dark matter, is highly (up to 10ˆ(−10)) suppressed in comparison to the Higgs. Dirac neutrino effective mass matrix is computed explicitly,
whose components depend on active-sterile mixing parameters, the latter being new sources of CP violation. Therefore, the CP asymmetry factor
and the baryon-antibaryon density are computed for the unflavoured leptogenesis, linking neutrino physics, QCD axion, and cosmological
parameters into a same physical framework.

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