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A Cosmological Solution to the Doublet-Triplet Splitting Problem

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We propose a model that can solve simultaneously the doublet-triplet splitting problem of grand unified theories, the electroweak hierarchy problem and the strong CP problem. The mechanism is based on the dynamics of two light scalars that can crunch the universe at the QCD phase transition if triplets are light or if the doublets are heavy or do not have a vev. The same mechanism was previously discussed as an explanation for the small value of the weak scale and of the QCD θ -angle. The two problems are solved also in our context by the same dynamics that explains the splitting between Higgs doublets and triplets. The only traces left at low energies are two light axion-like particles weakly coupled to the Standard Model.

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