

Topological pseudo-defects of a supersymmetric SO(10) model and cosmology

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Obtaining realistic supersymmetry preserving vacua in the minimal renormalizable supersymmetric $Spin(10)$ GUT model introduces considerations of the non-trivial topology of the vacuum manifold. The D -parity of low energy unification schemes gets lifted to a one-parameter subgroup $U(1)_D$ of $Spin(10)$. Yet, the choice of the fields signaling spontaneous symmetry breaking leads to disconnected subsets in the vacuum manifold related by the D -parity. The resulting domain walls, existing due to topological reasons but not stable, are identified as topological pseudo-defects. We obtain a class of one-parameter paths connecting D -parity flipped vacua and compute the energy barrier height along the same. We consider the various patterns of symmetry breaking which can result in either intermediate scale gauge groups or a supersymmetric extension of the Standard Model. If the onset of inflation is subsequent to GUT breaking, as could happen also if inflation is naturally explained by the same GUT, the existence of such pseudo-defects can leave signatures in the CMB.

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