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Superworld without supersymmetry

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It is a possibility that the superworld (supersymmetric partners of our world) does exist without supersymmetry. The two worlds are being distinguished by an unbroken discrete Z_2 symmetry (similar to R-parity in supersymmetry). We lose the solution to the hierarchy problem. However, such a scenario has several motivations. For example, the lightest neutral superworld particle will be a candidate for dark matter. The other being, as in supersymmetry, it is possible to achieve gauge coupling unification. One major difference with the supersymmetric theory is that such a theory is much more general since it is not constrained by supersymmetry. For example, some of the gauge couplings connecting the Standard Model particles with the superpartners now become free Yukawa couplings. As a result, the final state signals as well as the limits on the superworld particles can be modified both qualitatively and quantitatively. The reach for these superworld particles at the Large Hadron Collider (LHC) can be much higher than the superpartners, leading to the increased possibility of discovering new physics at the LHC

Summary

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