

Abstract

Supersymmetry (SUSY) can be used to solve the hierarchy problem in the Standard Model. If this is the case, evidence for SUSY will be found at the LHC in the near future. That is why the question of constructing phenomenologically viable supersymmetric models is important. The first and the most studied SUSY model is the Minimal Supersymmetric Standard Model (MSSM), it contains an ad hoc feature (imposed R-parity) and the μ -problem. There are several attempts to resolve both issues simultaneously which require extensions involving “exotic” coloured fields. We present a new class of supersymmetric models constructed to have a fully chiral spectrum (no “ μ -terms”) and no baryon or lepton number violating terms in the superpotential (R-parity is preserved) due to an extra $U'(1)$ gauge symmetry. The minimal models consist of the usual matter sector with family dependent $U'(1)$ charges, six Higgs weak doublets, and four charged singlets. We show general features of these models: vacuum stability, extra CP-violation and Electro-Weak breaking. Lastly, we discuss the experimental constraints on Flavour Changing processes and put bounds on the constants in the model.