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Killing the CMSSM softly

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The analysis of the data collected by the major LHC experiments during the LHC Run I has put strong constraints on supersymmetric models. We study the parameter space of the constrained Minimal Supersymmetric Standard Model (CMSSM) in a global fit, taking into account the non-observation of supersymmetry at the LHC, Higgs mass and rate measurements, as well as several cosmological and low energy observables. Before the start of the LHC, global fits of the CMSSM showed a favourable goodness-of-fit and indicated a strong preference for the existence of light SUSY particles. This region now has largely been excluded by the LHC. We present the final results of our study of the status of the CMSSM after the LHC Run1, where for the first time we use toy experiments to determine the p-Value of the model. A special emphasis is given on the dependence of the p-value on the choice of the observable set in the fit, where especially the Higgs rate measurements play a crucial role, since they had the potential for sensitivity to the CMSSM, had the Higgs boson been lighter. We find that the CMSSM is softly getting near its exclusion at the 95% CL.

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