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Diphoton and Diquark Resonances in U(1) Extension of MSSM (12' + 3')

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Inspired by the 750 GeV resonance displayed in Run II by the ATLAS and CMS experiments, we propose to incorporate it in an extension of the MSSM based on a suitable gauge symmetry G . The combination of G and a $U(1)$ R-symmetry yields a unique renormalizable superpotential containing a G -singlet superfield S , such that G breaks to MSSM at scale M with supersymmetry unbroken. The mass of the predicted MSSM singlet scalar resonance, as well as masses of the associated MSSM vectorlike fields do not exceed the symmetry breaking scale M because of G and $U(1)_R$, and indeed can be considerably smaller. The MSSM μ problem is elegantly resolved in these models. We present details for two models including production cross sections and decay widths based on well known $U(1)$ extensions of the MSSM.

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