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The NMSSM lives - with the 750 GeV diphoton excess

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We propose an NMSSM scenario that can explain the excess in the diphoton spectrum at 750 GeV recently observed by ATLAS and CMS. We show that in a certain limit with a very light pseudoscalar one can reproduce the experimental results without invoking exotic matter. The 750 GeV excess is produced by two resonant heavy Higgs bosons with masses ~ 750 GeV, that subsequently decay to two light pseudoscalars. Each of these decays to collimated photon pairs that appear as a single photon in the electromagnetic calorimeter. A mass gap between heavy Higgses mimics a large width of the 750 GeV peak. The production mechanism, containing a strong component via initial b-quarks, ameliorates a possible tension with 8 TeV data compared to other production modes. We also discuss other constraints, in particular from low energy experiments. Finally, we discuss possible methods that could distinguish our proposal from other physics models describing the diphoton excess in the Run-II of the LHC.

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