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SUSY-Yukawa Sum Rule at the LHC

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We propose the "SUSY-Yukawa sum rule", a relationship between physical masses and mixing angles of the third-generation quarks and squarks. The sum rule follows directly from a relation between quark and squark couplings to the Higgs, enforced by SUSY. It is exactly this relation that ensures the cancellation of the one-loop quadratic divergence in the Higgs mass from the top sector. Testing the sum rule experimentally at a lepton collider would thus provide a powerful check on SUSY as the solution to the gauge hierarchy problem. At a hadron collider, we can use this sum rule as a tool to place strong bounds on the stop and sbottom mixing angles (within the SUSY framework) by measuring the lightest stop and sbottom masses. We outline how the required mass measurements could be performed, and estimate the accuracy that can be achieved at the LHC.

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