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Partial Compositeness and The Fermion/Sfermion Mass Hierarchy

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The fermion mass hierarchy does not have an explanation in the Standard Model (SM). Moreover, an inverted hierarchy of the sfermion masses is suggested by the constraints from LHC data. To explain these known and expected hierarchies, we consider a supersymmetric model that uses partial-compositeness. The Higgs and third-generation matter superfields are elementary while the first two matter generations are composite with supersymmetry assumed to be broken by the strong dynamics. Linear mixing between elementary superfields and supersymmetric composite operators with large anomalous dimensions is responsible for simultaneously generating the fermion and sfermion mass hierarchies. This partial-compositeness framework can be considered to be dual by the AdS/CFT correspondence to the idea of a warped extra dimension that explains the mass hierarchies by wavefunction overlap.

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