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Non-linearly realised electroweak symmetry in the MSSM and phenomenological aspects

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Minimal Supersymmetry offers an explanation for the Hierarchy Problem in the Standard Model of Particle Physics, however still requires fine tuning in order to receive the correct higgs mass. We can consider compressed spectrum SUSY, where we can decouple the sparticle sector from the electroweak physics and still maintain a light higgs mass. The phenomenology of such situations, including calculations of the muon $g-2$, dark matter relic density and other observables are explored. Alternatively, we explore the particle spectrum of a SUSY model with the electroweak symmetry non-linearly realised. With the higgs realised as an SM singlet field in this parameterisation, we discover a unique and rich spectrum relevant to collider phenomenology.

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