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D-term uplift in Non-supersymmetric heterotic-string vacua

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In addition to the supersymmetric vacua in 10 dimensions, heterotic-string theory gives rise to non-supersymmetric vacua that in general contain physical tachyons in compactifications to 4 dimensions, which can be projected out by the GSO projections, and produce string amplitudes that are finite at one-loop. Over the past few years, in collaboration with Viktor Matyas and Ben Percival, we developed systematic methodology to analyse the spectrum of the tachyon free non-supersymmetric heterotic-string vacua and study their phenomenological properties. In collaboration with Alonzo Diaz Avalos, Viktor Matyas and Benjamin Percival, we analysed the would be Fayet-Iliopoulos term in non-supersymmetric heterotic string vacua and a D-term uplift of the vacuum energy from negative to positive energy. Examples of positive uplift are found for models with explicitly broken supersymmetry as well as models with Scherk-Schwarz breaking. The moduli space of the string compactifications will be discussed and vacua in which all geometrical moduli are fixed will be presented, with the eventual aim being to produce a string model with stable moduli and positive vacuum energy.

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