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# Species scale, worldsheet CFTs and emergent geometry

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We study infinite-distance limits in the moduli space of perturbative string vacua. The remarkable interplay of string dualities seems to determine a highly non-trivial dichotomy, summarized by the emergent string conjecture, by which in some duality frame either internal dimensions decompactify or a unique critical string becomes tensionless. Assuming the existence of light states, we investigate whether this pattern persists in potentially non-geometric settings, showing that (a proxy for) the cutoff of the gravitational effective field theory in perturbative type II vacua scales with the spectral gap of the internal conformal field theory in the same manner as in decompactification or emergent string limits, regardless of supersymmetry or whether the internal sector is geometric. As a byproduct, we elucidate the role of the species scale in (de)compactifications and show compatibility between effective field theory and worldsheet approaches in the presence of curvature deformations in geometric settings.

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