

Abstract Submitted
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Kaluza-Klein Masses and Couplings: Radiative Corrections to Tree-Level Relations¹ SKY BAUMAN — The most direct experimental signature of a compactified extra dimension is the appearance of an infinite tower of Kaluza-Klein particles. For example, a single flat extra dimension compactified on a circle leads to Kaluza-Klein states whose masses are integral multiples of the compactification scale and whose couplings are independent of the mode number. However, these masses and couplings are subject to radiative corrections. In this talk, I investigate the extent to which such radiative corrections deform the expected tree-level relations between Kaluza-Klein masses and couplings. As toy models for our analysis, I investigate a five-dimensional scalar ϕ^4 model and a five-dimensional Yukawa theory involving both scalars and fermions. In each case, I identify the conditions under which the tree-level relations are stable to one-loop order, and the situations in which radiative corrections distort these relations by introducing entirely new dependences on mode number. One unexpected result is that the squared masses of the fermions in Yukawa theory receive corrections that actually grow with mode number. Another is that a γ^5 interaction is radiatively induced in this theory. Although small, such corrections to the Kaluza-Klein spectrum can therefore distort the measurement of the apparent geometry of a large extra dimension, and may be observable at future colliders. Along the way, I also develop several new calculational techniques for renormalization in higher dimensions.

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