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Gapped Continuum Kaluza-Klein spectrum

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In this work we consider a warped five-dimensional model with an ultraviolet (UV) brane and, on top of the Standard Model zero modes, continua of KK modes with different mass gaps for all particles: gauge bosons, fermions, graviton, radion and Higgs boson. The model can be considered as a modelization in five dimensions of gapped unparticles. It has a singularity, at a finite (infinite) value of the proper (conformal) coordinate, which is admissible as it supports finite temperature in the form of a black hole horizon. An infrared (IR) brane, with particular jumping conditions, is introduced to trigger correct electroweak breaking. The gravitational metric is AdS_5 near the UV brane, to solve the hierarchy problem with a fundamental Planck scale, and linear, in conformal coordinates, near the IR, as in the linear dilaton and five-dimensional clockwork models. The branes, and singularity, distances are fixed, a la Goldberger-Wise, by a bulk scalar field with brane potentials explicitly breaking the conformal symmetry. We have computed the spectral functions and arbitrary Green's functions and shown how they can modify some Standard Model processes. This work is based on [1]. Related works are [2,3,4].

*References:

- [1] E. Megias, M. Quiros, arXiv:1905.XXXXX (to appear).
- [2] L. Randall, R. Sundrum, "A Large mass hierarchy from a small extra dimension", PRL 83 (1999) 3370-3373.
- [3] C. Csaki et al., "Continuum Naturalness", JHEP 1903 (2019) 142.
- [4] G. Giudice et al, "Clockwork / Linear Dilaton: Structure and Phenomenology", JHEP 1806 (2018) 009.

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