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A closed clockwork theory

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The clockwork mechanism is a relatively new mechanism to generate suppressed couplings in a theory containing no small parameters. We develop a new class of clockwork theories with an augmented structure of the near-neighbour interactions along a one-dimensional closed chain. Such a topology leads to new and attractive features in addition to generating light states with hierarchical couplings via the usual clockwork mechanism. For one, there emerges a $\mathbb{Z}_2$ symmetry under the exchange of fields resulting in a physical spectrum consisting of $\mathbb{Z}_2$ even and odd states with a two-fold degeneracy at each level. The lightest odd particle, being absolutely stable, could be envisaged as a potential dark matter candidate. Evidently, the theory can also be obtained as a deconstruction of a five-dimensional theory embedded in a geometry generated by a linear dilaton theory on a $S^1/\mathbb{Z}_2$ orbifold with three equidistant 3-branes.

Session

Beyond the Standard Model

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