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ON THE HYPOTHESIS THAT SPONTANEOUS CURVATURE FREEZES A SET OF SPACE-LIKE VARIABLES BEYOND THE OBSERVED FOUR AT ENERGIES MUCH BELOW THE PLANCK MASS*

("Früh krümmt sich, was ein Häkchen werden will")

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Abstract

The hypothesis is investigated that the well known interactions are manifestations of a gauge theory on a manifold $\mathcal{M}$ involving a set of space-like coordinates beyond space-time. The gauge group consists of coordinate transformations of $\mathcal{M}$. The scale invariant action couples a family of scalar fields φ_α to the curvature scalar in $\mathcal{M}$:

$$S_{\mathcal{M}} = \int d^{n}x \sqrt{|g|}\left[\left(\sum_\alpha \frac{\alpha}{2}\varphi_\alpha\varphi_\alpha\right)R + \frac{1}{2}\sum_\alpha \partial_A\varphi_\alpha\, g^{AB}\partial_B\varphi_\alpha\right]$$

$S_{\mathcal{M}}$ generates a spontaneous ground state solution with constant curvature with respect to the interval coordinates of the order of Planck's length for which $S_{\mathcal{M}} = 0$.

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