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Effective Cuscuton Theory

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Non-propagating fields have a wide presence in the literature, from non-propagating form fields in quantum hall systems to non-propagating 4-form fields in supersymmetric theories. Among these, the cuscuton field theory stands out as an extension of general relativity that avoids introducing additional propagating degrees of freedom, making it highly applicable in cosmology. Its simplicity provides a more accessible route to understanding how non-propagating fields may lose their dynamics. In this discussion, I will explore the construction of a general geometric description of the cuscuton field theory. This involves introducing curvature corrections to both the volume (potential) and the surface (kinetic) terms in the original cuscuton action. This geometric approach involves a stack of spacelike branes, separated by 4-dimensional bulks. We conjecture that the cuscuton, initially a discrete field, becomes continuous in the limit, there are many such transitions. Finally, I will show some examples.

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