

## High Energy Physics - Theory

# The string wave function across a Kasner singularity

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A collision of orbifold planes in eleven dimensions has been proposed as an explanation of the hot big bang. When the two planes are close to each other, the winding membranes become the lightest modes of the theory, and can be effectively described in terms of fundamental strings in a ten dimensional background. Near the brane collision, the eleven-dimensional metric is an Euclidean space times a 1+1-dimensional Milne universe. However, one may expect small perturbations to lead into a more general Kasner background. In this paper we extend the previous classical analysis of winding membranes to Kasner backgrounds, and using the Hamiltonian equations, solve for the wave function of loops with circular symmetry. The evolution across the singularity is regular, and explained in terms of the excitement of higher oscillation modes. We also show there is finite particle production and unitarity is preserved.

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