

Abstract Submitted
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Spacetime Topology from Cosmic Strings and Foliations

CHRISTOPHER DUSTON, Merrimack College — One of the major difficulties in the mathematical representation of the gravitational field is that it is not generally possible to determine when two spacetime models are unique - this is known as the exotic smoothness problem. In this talk I will discuss how to completely enumerate the differentiable structures of a closed four-manifold using a branched covering of the four-sphere. This will allow us to avoid the problem of exotic smoothness, and construct a formally complete semiclassical partition function. This construction naturally includes cosmic strings and a unique specification of the topology of a codimension two foliation of the four-manifold via a redefinition of the geometric degrees of freedom. As a result of this construction, we propose that spacetime topology emerges as a result of symmetry breaking of the fundamental fields in the early universe.

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