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Lorentzian de Sitter Space From Causal Dynamical Triangulations JONAH MILLER, University of Guelph, JOSHUA COOPERMAN, Radboud Universiteit Nijmegen, KYLE LEE, Chapman University — Causal Dynamical Triangulations (CDT) is a sum-over-histories approach to quantum gravity where the histories in question are treated as discrete "causal" piecewise flat manifolds. CDT is usually studied by running Monte Carlo simulations after analytically continuing the manifolds into Euclidean signature, so most previous investigations found that the large length-scale limit of the CDT universe's ground state is Euclidean de Sitter space. However, by fixing the geometries of the initial and final spacelike boundaries in (2+1)-dimensional CDT, we construct ensembles of triangulations where the large-scale limit of the dominant contribution to the path integral appears to be Lorentzian de Sitter space. In the context of the minisuperspace model, we confirm that, although the topological signature is Euclidean, both the spatial volume as a function of Euclidean time and the propagator for the fluctuations of the geometry as a function of Euclidean time agree well with Lorentzian de Sitter space. Comparing the spectral dimension of this ensemble with that of Lorentzian de Sitter spacetime in Causal Set theory offers possible additional evidence of the Lorentzian nature of the ensemble. This implies that the common picture of CDT's ground state needs reexamination.

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