



Department of
Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

The Power of Lorentzian Wormholes

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Zoom link shall be shared separately



As shown by Louko and Sorkin in 1995, topology change in Lorentzian signature involves spacetimes with singular points, which they called crotches. We modify their construction to obtain Lorentzian semiclassical wormholes in asymptotically AdS. These solutions are obtained by inserting crotches on known saddles, like the double-cone or multiple copies of the Lorentzian black hole. The crotches implement swap-identifications, and are classically located at an extremal surface. The resulting Lorentzian wormholes have an instanton action equal to their area, which is responsible for topological suppression in any number of dimensions. We conjecture that including these Lorentzian wormhole spacetimes is gauge-equivalent to path integrating over all mostly Euclidean smooth spacetimes. We present evidence for this by reproducing semiclassical features of the genus expansion of the spectral form factor, and of a late-time two point function, by summing over the moduli space of Lorentzian wormholes. As a final piece of evidence, we discuss the Lorentzian version of West-Coast replica wormholes.