Summary: We continue the study of real-time replica wormholes initiated in [the authors, J. High Energy Phys. 2021, No. 5, Paper No. 117, 40 p. (2021; Zbl 1466.83026)]. Previously, we had discussed the general principles and had outlined a variational principle for obtaining stationary points of the real-time gravitational path integral. In the current work we present several explicit examples in low-dimensional gravitational theories where the dynamics is amenable to analytic computation. We demonstrate the computation of Rényi entropies in the cases of JT gravity and for holographic two-dimensional CFTs (using the dual gravitational dynamics). In particular, we explain how to obtain the large central charge result for subregions comprising of disjoint intervals directly from the real-time path integral.

MSC:

83C05 Einstein’s equations (general structure, canonical formalism, Cauchy problems)
83C80 Analogues of general relativity in lower dimensions
83D05 Relativistic gravitational theories other than Einstein’s, including asymmetric field theories
83E05 Geometrodynamics and the holographic principle
81P17 Quantum entropies
81T40 Two-dimensional field theories, conformal field theories, etc. in quantum mechanics
81S40 Path integrals in quantum mechanics

Keywords:
AdS-CFT correspondence; gauge-gravity correspondence

Software:
DLMF

Full Text: DOI arXiv
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