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Classification of Monodromies in Lorentzian CFT correlators

We will explain that the Lorentzian CFT (time-ordered and OTOC) has a far richer structure and becoming more and more important. In CFT correlators generically there are branch points at $0, 1$, and ∞ in the correlators. Whenever two operators cross their lightcones they go through a monodromy around one of the branch points. A natural and very important question is,

1. Can one access all possible non-trivial monodromies (or complex sheets) around these branch points by moving in configuration space (boundary of AdS)?
2. Is there a possibility that one does move around in configuration space and comes back to the same configuration with a non-trivial monodromy. Demanding the uniqueness of the correlator in the same position we can derive non-trivial bounds.

So the challenge is

1. Either show that the correlator is indeed unique and the monodromy in cross-ratio space does not depend on the path one takes to go from one configuration to another configuration.
2. Or, show that there indeed exist non-trivial bounds on the correlators.

After an extensive study of the monodromies, we conclude that in two dimensions the monodromy does not depend on the path. We have proved it for all possible simply connected paths. We classified all possible causal structures in configuration space and the monodromies associated with them. We have done it for both time-ordered and OTOC cases. We will also comment on higher dimensions.

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