

Abstract

We study the fluctuation entropy for two-dimensional matter systems with an internal symmetry coupled to Jackiw--Teitelboim(JT) gravity joined to a Minkowski region. The fluctuation entropy is the Shannon entropy associated with probabilities of finding a particular charge in a region. We first consider a case where the matter has a global symmetry. We find that the fluctuation entropy of Hawking radiation shows an unbounded growth and exceeds the entanglement entropy in the presence of islands. This indicates that the global symmetry is violated. We then discuss the fluctuation entropy for matter coupled to a two-dimensional gauge field. We find a lower bound on the gauge coupling g_0 in order to avoid a similar issue. Also, we point out a few puzzles related to the island prescription in presence of a gauge symmetry.

Based on: <https://arxiv.org/abs/2109.03841> in collaboration with Amirhossein Tajdini