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Log divergence in finite-size quantum Riemann metric TIAGO GRANGEIRO SOUZA BARBOSA LIMA, MICHAEL KOLODRUBETZ, ANATOLI POLKOVNIKOV, Boston University — We study the metric tensor, an object that describes distances between quantum states within a ground state manifold. Traditionally, it has been studied for changes in external parameters (e.g., magnetic field) at fixed system size. Here, we instead treat the system size as a tunable parameter and analyze the distance between wave functions at different system sizes. To emulate the effect of a change in the size of the system, we calculate the metric with respect to the position of a movable delta function potential, starting with the simplest case of free fermions. We find that the metric tensor diverges logarithmically with system size, similar to the entanglement entropy in a CFT. We also calculate the same metric tensor for the transverse field Ising model via perturbation theory, and comment on the relationship of our results to the spacetime metric in general relativity.

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