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Kazuki Doi: Entanglement Suppression Due to Black Hole Scattering

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We consider the evolution of entanglement entropy in a two-dimensional conformal field theory with a holographic dual. Specifically, we are interested in a class of excited states produced by a combination of pure-state and mixed-state local operator quenches. While we expect a logarithmic time dependence of entanglement entropy relative to the vacuum in the case of the insertion of a single pure-state local operator, the presence of a mixed-state quench nearby appears to heavily suppress its contribution, reducing it to a time-independent constant bump. The degree of suppression depends on the relative position of the quenches as well as the ratio of regularization parameters associated with the quenches; in varying them we observe oscillatory behavior in the degree of suppression, but it also comes with a discrete set of values of the parameter ratio at which the suppression becomes singular and the quench's contribution to entanglement entropy is seemingly infinite. This work sheds light on the interesting properties of gravitational scattering involving black holes.