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## A first law for entanglement rates

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The first law of entanglement entropy states that under a perturbation of the state of a CFT, the change in entanglement entropy is proportional to the change in energy. We use holography to study entanglement entropy in conformal field theories perturbed by a source linear in time. Under certain assumptions, we find that the first law may be violated, however the rates of change of the entanglement entropy and energy are proportional. An explicit example is presented for CFTs deformed by marginal scalar operators.

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