

Abstract Submitted  
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**Gravity from the Thermodynamics of Spacetime** ANDREW SVESKO, Arizona State University, MAULIK PARIKH, Arizona State University, Beyond Center and Cosmology Initiative — There is a paradigm shift underway in our understanding of gravity: Gravity might not be a fundamental force at all. The intense theoretical study of black hole thermodynamics has led to the radical idea that gravity, and perhaps spacetime itself, might be only an emergent phenomenon. That is, gravity might emerge in a macroscopic, thermodynamic limit of some underlying microscopic theory, in roughly the way that the macroscopic fluidity of water emerges from microscopic molecules of  $H_2O$ . Applying  $dQ = T\delta S$ , where  $S$  is given by the entropy formula for a black hole, I will show how to derive the classical equations of Einstein's theory of general relativity, as well as some of its generalizations, directly from the first law of thermodynamics. This result provides evidence that the origin of gravity is thermodynamics.

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