

Abstract Submitted  
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**Partial erasure of a bit: Direct measurement of Shannons entropy function using a feedback trap** JOHN BECHHOEFER, MOMCILO GAVRILOV<sup>1</sup>, RAPHAEL CHETRIT<sup>2</sup>, Dept. of Physics, Simon Fraser University, Canada — In 1961, Landauer proposed that erasing one bit of information should require a work of  $kT \ln 2$  per bit erased. Standard *gedanken* and recent actual experiments have demonstrated how to erase a single bit. Here, using a feedback trap to place a colloidal particle in a controllable virtual potential, we show how to erase part of a bit, finding that the minimum average work  $W/kT$  required is consistent with  $\ln 2 - H(p)$ , where  $H(p) = -p \ln p - (1 - p) \ln(1 - p)$  is the Shannon entropy function for two states, with  $p$  the nonequilibrium probability to be in one of the states. While the Shannon entropy has long been hypothesized to be the appropriate definition for nonequilibrium systems, we directly confirm by experiment its functional form and relation to work.

<sup>1</sup>Present address: Dept. of Biophysics and Biophysical Chemistry, Johns Hopkins University.

<sup>2</sup>Also: PIMS Europe-CNRS. UMI 3069. Vancouver, BC, Canada.

John Bechhoefer  
Dept. of Physics, Simon Fraser University, Canada

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