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Exceeding the Carnot efficiency NELLY HUEI YING NG, Delft Univ of Tech, MISCHA WOODS, University College of London, Department of Physics and Astronomy, London WC1E 6BT, United Kingdom, STEPHANIE WEHNER, Delft Univ of Tech — A suitable way of quantifying work for microscopic quantum systems has been constantly debated in the field of quantum thermodynamics. One natural approach is to measure the average increase in energy of an ancillary system, called the battery, after a work extraction protocol. The quality of work extracted is usually argued to be good by quantifying higher moments of the energy distribution, or by restricting the amount of entropy to be low. This limits the amount of heat contribution to the energy extracted, but does not completely prevent it. We show that if one allows for a definition of work that tolerates a non-negligible entropy increase in the battery, then a small scale heat engine (with a similar set up to that of arXiv:1506.02322) can possibly exceed the Carnot efficiency. This can be done without using any additional resources such as coherence or correlations, and furthermore can be achieved by using finite-size quantum heat baths as well.

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